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IMPLICATIONS OF THIRD WORLD ACQUISITION AND EMPLOYMENT OF BALLISTIC MISSILES AND SPACE LAUNCH VEHICLES FOR SDIO/POET

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October 1992

Prepared for
Ballistic Missile Defense Organization (BMDO)
and
The Phase One Engineering Team (POET)

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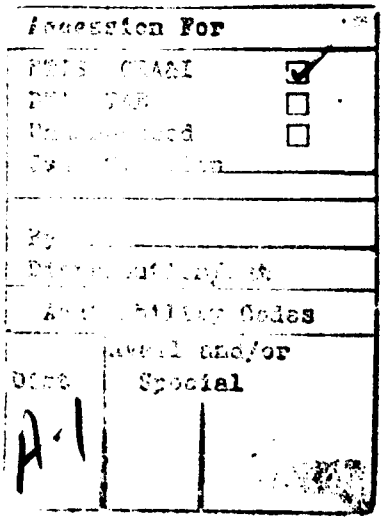
PREFACE

This document was prepared for the Director of the Countermeasures Office of the Strategic Defense Initiative Organization (SDIO) and the Threat Working Group of the Phase One Engineering Team (POET) under the task entitled "Implications of Third World Acquisition and Employment of Ballistic Missiles and Space Launch Vehicles for SDIO/POET." It presents five separate discussions on how the Third World militaries might acquire, produce, employ, and defend against ballistic missiles. These studies demonstrate how Third World countries plan to utilize their ballistic missile inventories once acquired and how SDIO/POET might anticipate such activities in designing/operating national and theater missile defense systems.



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EXECUTIVE SUMMARY

A. MOTIVATIONS OF SELECTED THIRD WORLD STATES FOR ACQUIRING BALLISTIC MISSILES

- Ballistic missile proliferation poses a fundamental challenge to the United States.
- Proliferation is taking place most extensively in regional hot spots like the Middle East. Worse yet, many of these nations have either expressed an interest in or have demonstrated the intention to use ballistic missiles.
- A combination of sectarian violence, deep seated suspicion of outsiders, cultural dispositions toward risk-taking, and multiple regional enemies mean that most Third World states face a far less predictable strategic environment than enjoyed by the superpowers in the past.
- Geography poses a different perspective on Third World leaders:
  - -- Most nations are small and so only a few ballistic missiles can inflict catastrophic destruction.
  - -- Distances between rivals are short. Thus, "short-range" missiles have the same implications for regional rivals that ICBMs have had for the United States and Russia.
- Third World states want ballistic missiles for multiple reasons. These include desires for:
  - -- Emotional satisfaction and international prestige,
  - -- Deterrence of regional rivals,
  - -- Increased regional autonomy *vis a vis* the superpowers,
  - -- Delivery of weapons of mass destruction,
  - -- Increased war-fighting potential,
  - -- Offsetting operational, technological, or numerical advantages enjoyed by enemy conventional forces, and
  - -- Making money from foreign military sales either as profit or to underwrite domestic weapons programs.
- Individual motivations to acquire ballistic missiles often reinforce each other.
- The lure of ballistic missiles in the Third World is unlikely to abate.

B. MOTIVATIONS FOR PRODUCING BALLISTIC MISSILES AND SPACE LAUNCH VEHICLES

- Despite the substantial financial burden of indigenous production of ballistic missiles and space launch vehicles, and the limited utility of most early models, more and more nations are seeking indigenous production capabilities.
- The desire for self-sufficiency in key defense sectors is very basic and powerful. It transcends alliance structures, ideologies, and forms of government.
- Technology push is as important a motivation as the pull of national security requirements.
- Economic motives are seldom enough, in themselves, to convince nations to begin domestic production. Instead, economics reinforces other motives for indigenous production by offering: (1) sources of much needed foreign exchange, (2) ways of reducing unit costs by generating higher production runs, (3) ways of offsetting the R&D costs for follow-on systems, and (4) a vehicle for personal aggrandizement.
- Each motive--national security, technology, and economics--is a powerful stimulant in its own right. However, it is probably the synergism between them that finally persuades national leaders to undertake production despite the substantial financial burden and limited utility of most initial systems.
- Changing conditions in the international arms market, coupled with the growing military importance of ballistic missiles, probably mean that more and more nations will seek domestic production of missiles and space launch vehicles in future.
- If this increased production takes place, it will mean the proliferation of multiple hybrid missiles/space launch systems as nations tailor future systems to their individual requirements and capabilities.
- Proliferation of hybrid systems, in turn, will greatly complicate the job of SDIO architects and systems designers by expanding the range of technological possibilities they must design missile defenses to meet.

C. THIRD WORLD BALLISTIC MISSILE TARGETING STRATEGIES

- The Third World target selection process is dynamic and its target set will be evolutionary for the near term.
- There will be considerable modification in Third World objectives as their technical capabilities grow.
- Third World targeting priorities will not, however, be dictated solely by technology. Consequently, countervalue targeting will remain a cornerstone of

many Third World targeting strategies even after the technological imperative to do so disappears.

- Cities, especially capitals, are a top priority.
- Some cities, however, may be "untouchable" because of the religious significance attached to them.
- Third World states will target an adversary's economy both directly (with missile strikes) and indirectly (by sowing terror among the population).
- Third World states may also engage in "ethnic targeting" in order to weaken the political base of rivals.
- Nuclear reactors are becoming increasingly attractive targets.
- Third World nations also seek to influence the behavior of the West by signaling their apparent intention to strike a regional neighbor.
- Other more militarily significant targets include: (1) enemy missile forces, (2) airfields, (3) large military bases and staging areas, and (4) troop concentrations.

D. IMPLICATIONS OF THE GULF WAR FOR THIRD WORLD BALLISTIC MISSILE OPERATIONS

- The outcome of the Gulf War will significantly influence how nations structure, equip, and employ military forces in the future.
- It is useful, therefore, to study what lessons Third World military planners might learn about the use of ballistic missiles and their interplay with missile defenses.
- Major potential "lessons learned" are likely to be:
  - -- Ballistic missiles have great strategic value.
  - -- Present Third World missiles have limited military utility.
  - -- Mobile missiles are survivable, but not immortal.
  - -- The initial period of war is critical, possibly even decisive for the overall outcome of the war.
  - -- Surprise can have a decisive impact.
  - -- Deception pays large dividends.
  - -- Electronic countermeasures are essential.
  - -- Missile defenses are feasible, but not perfect.
  - -- Defense suppression is important.

- Broad implications of these lessons include:
  - Growing Third World interest in acquiring and using ballistic missiles.
  - Modernization of Third World missile inventories by increasing missile range, payload, and accuracy. There will also be interest in decoys, electronic jamming, and increasing use of deception.
  - Emphasis on acquiring more mobile ballistic missiles.
  - Increasing use of preemption, first strikes, and massed employment of ballistic missiles as early as possible in future conflicts. These activities may also be coupled with a vigorous defense suppression campaign as well.
  - Increased world-wide interest in acquiring and deploying ballistic missile defense.

E. THE EMERGENCE OF BALLISTIC MISSILE DEFENSES IN THE NEW WORLD ORDER

- Because of the Gulf War and the collapse of the Soviet Union, there is growing world-wide interest in acquiring missile defenses. There is also unprecedented opportunity to do so.
- There are three general trends emerging with respect to ballistic missile defenses:
  - Heightened U.S. and Russian interest in deploying some type of limited defenses,
  - Growing Third World resolve to acquire their own missile defense capabilities, and
  - Increasing availability of defense systems in the international arms market.
- These trends have a number of far-reaching implications for the future. They include:
  - Ballistic missile defenses are no longer just a subject of academic debate. They are real weapons. They have demonstrated a capability to make a significant strategic impact on the conduct of war.
  - Interest in acquiring missile defenses is no longer confined to just the U.S. and Russia/CIS.
  - Proliferation of ABM technologies to (and by) Third World countries is largely outside the control of the ABM Treaty and the Missile Technology Control Regime.

- It is no longer a U.S.-Russian bilateral decision whether missile defenses will exist and, if so, what capabilities they will have.
- Although the U.S. and Russia tend to discuss existing and near-term BMD systems in the theater or ATBM context, they are really considered *strategic* defenses by Third World nations.
- Proliferation of indigenous Third World BMD technology programs, coupled with growing Russian interest in selling defense systems abroad, means that prudent Third World defense planners must assume the presence of defenses in future regional conflicts. This, in turn, increases their incentive to design countermeasures into their existing and projected ballistic missile systems.

I. INTRODUCTION

This document (originally published as a series of "white-papers"), prepared for the Director of the Countermeasures Office of the Strategic Defense Initiative Organization (SDIO) and the Threat Working Group of the Phase One Engineering Team (POET) presents five separate discussions on how the Third World militaries might acquire, produce, employ, and defend against ballistic missiles. The first study establishes a context for the how Third World countries might acquire ballistic missiles which leads into the second study which expands on one particular strategy, that of indigenous production of ballistic missiles. The third and four studies examines how Third World countries, once they acquire ballistic missiles, might employ them in their various regional contexts and what lessons might be drawn from their real world operational use in the Gulf War. Finally, the last study examines the implications of the widespread proliferation of ballistic missile defense systems and what they portend for future Third World ballistic missile systems in various regional contexts. These studies demonstrate how Third World countries are and will continue to plan to utilize their ballistic missile inventories once acquired and how SDIO/POET might anticipate such activities in designing/operating national and theater missile defense systems.

As initially conceived, each paper provided background to engineers and scientists on the Technical Countermeasures Red Teams about significant elements of Third World military style and standard operating procedures. While originally drafted with this audience in mind, these papers serve equally well to introduce the non-Third World specialist to major concepts that help shape Third World decisions. These studies were also part of a continuing effort by the Countermeasures Office to identify major Third World political, bureaucratic, operational, and military constraints that could influence the development and application of technical countermeasure to a U.S. Strategic Defense System.

II. MOTIVATIONS OF SELECTED THIRD WORLD STATES FOR ACQUIRING BALLISTIC MISSILES

Ballistic missile proliferation poses a fundamental challenge. For one thing, more than twenty Third World states now have some type of missile capability either in operation or under development.[1] The number of such countries, and the capabilities of their systems, should increase over the next decade. The problems of missile proliferation are compounded by that fact that many of these same states also have very active programs to develop chemical and nuclear weapons; e.g., as many as eight of these countries should be capable of producing nuclear weapons during the next decade.[2]

Proliferation is taking place most extensively in political hot spots like the Middle East, Southwest Asia, and on the Korean Peninsula--places where the United States either has a substantial military presence already or where it has significant political interests which might require military intervention. Worse yet, many of these emerging regional powers have either expressed an interest in or have already demonstrated the intention to use ballistic missiles.

A. THIRD WORLD PERSPECTIVE

It is tempting to view the spread of ballistic missiles to several nations in the same region (and the resultant strategic balance) as similar to the cold war situation that has existed between the superpowers over the last 30 years. From this perspective, regional balances are little more than a microcosm of the superpowers' situation. When viewed this way things do not seem so bad. Deterrence through mutually assured destruction, after all, appears to have kept the peace since the appearance of U.S. and Russian ballistic missile forces. This analogy has led some analysts to conclude that Third World stability might actually be enhanced by the spread of nuclear weapons and, by extension, ballistic missiles.[3]

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1 W. Seth Carus, *Ballistic Missiles in Modern Conflict*, Praeger, New York, 1991, p. xvii.

2 Director of Central Intelligence William Webster as quoted by Michael Wines, "Congress Starts Review of U.S. Military Posture," *The New York Times*, January 24, 1990, p. A11.

3 For examples of such thinking see: Steven J. Rosen, "Nuclearization and Stability in the Middle East," in *Nuclear Proliferation and the Near-Nuclear Countries*, Onkar Marwah and Ann Schulz, eds., Ballinger, Cambridge, 1975. See also Kenneth Waltz, "The Spread of Nuclear Weapons: More May Be Better," *Adelphi Paper*, No. 171, International Institute for Strategic Studies, London, 1987.

Such thinking, however, misses the point. The situations of Third World states *vis a vis* each other and the superpowers are very different than the one between the United States and the Soviet Union over the last 30 years.

For one thing, regional situations are much more complex than the U.S.-Soviet rivalry. During the cold war, the world was essentially divided between the United States and its allies on one side versus the Soviets and their allies on the other. This is definitely not the case in the Third World. In the Middle East for example, there are at least nine pairs of regional rivalries: (1) Iran-Iraq, (2) Syria-Iraq, (3) Syria-Israel, (4) Iraq-Israel, (5) Egypt-Israel, (6) Saudi Arabia-Israel, (7) Saudi Arabia-Iran, (8) Egypt-Libya, and (9) Saudi Arabia-Iraq. In addition to these rivalries, there are rivalries between some of these states and the superpowers. The same complex pattern is also apparent in Southwest Asia. Here there are three main pairs antagonisms: (1) India-China, (2) India-Pakistan, and (3) Pakistan-Afghanistan.

Animosities in Third World regions are more deep seated, more long-standing, and more personal than those between Russians and Americans.[4] Even in the worst of times, there was little personal hatred between Americans and Russians. Indeed, they always appeared to like each other in personal situations or, at a minimum, were willing to talk. Such is far from the case in the Arab-Israeli context. Here primordial hatreds and fears shape the perceptions of citizens and governments alike. Most Israeli citizens believe that the Arab states would carry out a genocidal massacre of Jews given the chance.[5] Conversely, Arab perceptions are colored by equally powerful hatreds rooted in a mix of shame and humiliation at past losses to Israel, religious fervor, and mistrust of Israeli territorial ambitions.[6]

Similar deep seated hatreds exist elsewhere in the Third World as well. The 1947 division of British colonial India into independent Pakistan and India was accompanied by communal massacres (estimates as high as one million dead) and the migration of approximately 14 million people between the two new states.[7] The memories of such experiences die hard and sometimes lead to bizarre assessments of contemporary events.

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4 W. Seth Carus, "Let's Close Down the Mideast Arms Bazaar," *The World and I*, September 1991, p. 104.

5 Robert E. Harkavy, "After the Gulf War: The Future of Israeli Nuclear Strategy," *The Washington Quarterly*, Summer 1991, p. 167.

6 Ibid.

7 Mahnaz Ispahani, *Pakistan: Dimensions of Insecurity*, Adelphi Papers 246, International Institute of Strategic Studies, London, Winter 1989/1990, p. 38.

For example, conservative Pakistani politicians have in the past denounced domestic criticisms of Pakistan's nuclear program as the work of an American-Jewish-Hindu conspiracy against Islam.[8]

A combination of sectarian violence, suspicion, cultural propensities toward risking-taking, and multiple regional enemies mean that most Third World nations face a far less predictable strategic environment than that enjoyed by the superpowers.[9] Also, conflicts in the Third World tend to be intense and there is a greater willingness to suffer high casualties (e.g., the Iran-Iraq War). In such an environment, mutually assured deterrence based on the superpower model may be sorely tested by the proliferation of ballistic missiles.[10] Furthermore if one is tempted to draw upon the lessons of superpower behavior for assessing Third World behavior, it is worth remembering that the concept of deterrence through mutual destruction never made war between the superpowers impossible, only irrational.[11]

Geography also imposes a different perspective on Third World leaders from that of American and Soviet decision-makers. Most Third World nations are small and so only a few ballistic missiles can inflict catastrophic destruction. For example, delivery of one 200 kiloton weapon each on Tel Aviv, Jerusalem, and Haifa would effectively end Israel's national existence.[12] Also, distances are small between Third World rivals. Thus, even relatively short-range ballistic missiles (by U.S. and Russian standards) can strike most of the enemy's country.[13] For example, Damascus and Tel Aviv are less than 60 miles apart. Given such distances, Syrian short-range SCUDs are capable of reaching all but the

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8 Ibid., p. 36.

9 Martin Navias, *Ballistic Missile Proliferation In The Third World*, Adelphi Papers 252, International Institute for Strategic Studies, London, Summer 1990, p. 4.

10 Ibid.

11 Ibid.

12 Ibid., p. 167.

13 Although we are talking about "short-range" in relative terms in this illustration, it is worth noting in passing that more official definitions exist in the U.S. Government. According to the Missile Technology Control Regime, for instance, "short-range" ballistic missiles are defined as those systems that have a 100 to 300 kilometer range. The *Dictionary of Military and Associated Terms* published by the Joint Chiefs of Staff, however, define "short-range" ballistic missiles as those with a range under 600 nautical miles (1,100 kilometers). By stretching the point, one could also include long-range Western missile artillery systems like MLRS/ATACMS which can have ranges in excess of 90 kilometers. For a fuller discussion on the problems of defining "short-range," see W. Seth Carus, *Trends and Implications of Missile Proliferation*, October 15, 1991, pp. 1-2.

southern most points in Israel.[14] Similarly, North Korea can cover two-thirds of South Korea with the basic SCUD-B ballistic missile. Thus, "short-range" ballistic missiles have the same strategic implications for regional rivals that intercontinental ballistic missiles had for the superpowers during the Cold War.

Finally, the potential to deliver weapons of mass destruction via ballistic missiles is seen by some Third World nations as providing a "psychological edge" *vis a vis* regional rivals.[15] For example, the threat of SCUDs carrying chemical weapons raises Israeli anxieties by bringing back visions of the holocaust. Similarly, North Korea could have considerable emotional impact on the Japanese by acquiring longer ran clear armed SCUDs because of the memory of what happened to Hiroshima and Naga n 1945.

B. MOTIVATIONS OF INDIVIDUAL THIRD WORLD NATIONS

1. Israeli Motives

Israel apparently sees ballistic missiles, primarily armed with nuclear weapons, as a way of addressing what an Israeli National Intelligence estimate once called "existential threats."[16] Consequently, Israel's chief interests in having ballistic missiles are primarily to:

- Deter Arab enemies from unleashing a genocidal attack,[17]
- Deter direct foreign military intervention on the side the Arabs,[18]
- Possess an assured means of delivering nuclear weapons to far distant targets should deference fail,[19]
- Redress a significant numerical imbalance between Israeli and Arab conventional forces if Arab forces threaten to overrun Israel,[20] and

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14 Janne E. Nolan, *Trappings of Power: Ballistic Missiles In The Third World*, The Brookings Institution, Washington, 1991, p. 78.

15 "Saudi Purchase of Chinese Missiles Changes Middle East Military Balance," *Aviation Week and Space Technology*, March 28, 1988, p. 30.

16 Avner Cohen, "The Israeli Press Covers, and Then Covers Up, the Bomb," *Deadline*, Summer 1991, p. 19.

17 Ibid., p. 19.

18 Hugh Carnegy, "Israel Under Pressure Over Nuclear Policy," *London Financial Times*, October 24, 1991, p. 4.

19 Eric H. Arnett, "Choosing Nuclear Arsenals: Prescriptions and Predictions for New Nuclear Powers," *Strategic Studies*, September 1990, p. 156.

20 Harkavy, op. cit., pp. 166-167.

- End battlefield attrition rates when they threaten to undermine Israel's long-term viability as a society.[21]

2. Syrian Motives

The quest for strategic parity with Israel has been a primary driver of overall Syrian military acquisition and defense policy over the years.[22] This policy objective is reinforced by Syrian aspirations to lead the Arab world. These two broad goals lead to more narrowly focused motives for acquiring ballistic missiles. These include desires to:

- Offset the operational and technical advantages traditionally enjoyed by Israeli conventional forces, especially air and air defense elements,[23]
- Deliver counterforce and countervalue strikes deep into central Israel,[24]
- Retain the initiative and control the pace of operations during the initial period of war with Israel,[25] and
- Deliver chemical munitions.[26]

Recent Syrian purchase of longer range SCUD-C missiles from North Korea, coupled with its participation in the Gulf War against its long-standing rival (Iraq), may signal new Syrian motivations for acquiring missiles. That is, Syrian defense planners may see these longer range, more capable systems as a way of deterring future Iraqi retribution for Syrian participation in the Gulf War coalition. Additionally, Syrian upgrading of its missile inventory may also signal its aspiration to assert more influence over other countries in the region.

3. Saudi Arabian Motives

Officially, Saudi Arabian government officials maintain that their sole interest in ballistic missiles is to provide a "psychological edge" for deterring bellicose Arab neighbors, (particularly Iran) who have continually threatened Saudi Arabia for the last 15-

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21 Ibid., p. 169.

22 Daniel Pipes, "Is Damascus Ready for Peace?" *Foreign Affairs*, Fall 1991, p. 37.

23 W. Seth Carus, *Ballistic Missiles In Modern Conflict*, op. cit., pp. 29-30.

24 Martin S. Navias, "Ballistic Missile Proliferation In The Middle East," *Survival*, May/June 1989, p. 228.

25 *Ballistic Missile Proliferation In The Third World*, op. cit. p. 37.

26 Ibid., p. 227.

20 years.[27] Failing that, Saudi military planners see these missiles as giving them "a second-strike capability" even though the missiles have only conventional warheads.[28]

The Saudi Ambassador to Washington has also gone to great pains to assure members of Congress that these missiles in no way threaten Israel.[29] Despite such Saudi assurances, Senators like the Chairman of the Foreign Relations Committee, Claiborne Pell, remain unconvinced.[30] Such skepticism is in order given past Saudi financing of purchases of ballistic missiles by passionately anti-Israeli states like Syria.[31] Thus, one must assume for planning purposes that (despite Saudi denials) the desire to deter or retaliate against Israel was an implicit Saudi motive in acquiring missiles.

Desire for international prestige and regional influence apparently also exerted a strong influence on the Saudi decision to purchase ballistic missiles. Saudi acquisition of top-of-the-line technology in the Chinese CSS-2 reinforced Saudi Arabia's image as the geopolitical and geostrategic leader of the region. This purchase was also a symbolic refutation of charges by Iranian fundamentalists that the Saudi royal family was no longer an effective (and hence legitimate) protector of Moslem holy places.[32]

4. Iraqi Motives

The drive to acquire ever more powerful ballistic missiles was a direct outgrowth of Iraq's long cherished desire to be a regional hegemon and the leader of the pan-Arab world against Israel and the West. Additionally, the acquisition of ballistic missiles was apparently seen as part of Iraq's overall national modernization plans--efforts which would raise Iraq's international status and domestic self-image. In short, missiles would help Iraq become a powerful, modern nation.

Changing international conditions have only increased Iraqi interest in reacquiring a potent missile force once United Nations sanctions end. The disappearance of security guarantees from Moscow, coupled with the outcome of the Gulf War, have driven home to Baghdad policy-makers the need for strategic self-sufficiency.

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27 "Saudi Purchase of Chinese Missiles Changes Middle East Military Balance," op. cit., p. 30.

28 Ibid.

29 Ibid.

30 Ibid.

31 Steven Emerson, "The Postwar SCUD Boom," *The Wall Street Journal*, July 10, 1991, p. 12.

32 Thomas G. Mahnken and Timothy D. Hoyt, "The Spread of Missile Technology to the Third World," *Comparative Strategy*, No. 30, 1991, p. 251.

More specific Iraqi motives apparently included desires to:

- Deter Israeli punitive/preemptive strikes into Iraq such as the Israeli bombing of the partially completed Osirak nuclear reactor,[33]
- Deter strategic, countervalue attacks by regional rivals, especially Iran,
- Deter Western intervention in the region, particularly in light of the outcome of the recent Gulf War,
- Obtain assured delivery of weapons of mass destruction,[34]
- Offset enemy conventional force advantages, especially in air defenses, and
- Correct unfavorable battlefield attrition rates and/or grossly unfavorable wartime correlations between conventional forces.[35]

5. Iranian Motives

Iranian motives for acquiring ballistic missiles are a complex mix of pragmatism, suspicion of foreign intentions bordering on paranoia, bitter experience with the harsh realities of the Iran-Iraq war, and a desire to lead the Islamic world. These factors combine to convince the Iranians that "[ballistic missiles are] the most important and most essential weapons of the world." [36]

Iranian leaders have long argued that deterrence was the main role of their missile force. According to Hashemi Rafsanjani (then speaker of the Iranian parliament and acting commander in chief of Iranian military forces), "for us, missiles have a deterrent role" which will eliminate the "very thought of an attack with missiles . . . from our neighbors."[37] Later he claimed that Iran's efforts to up-grade its missile force with longer range systems were forced upon it by the need to "somehow dissuade the Iraqi Government from attacking cities."[38]

Ballistic missiles apparently offered Iran more than just the possibility of deterrence and, failing that, retribution. That is, ballistic missiles offered the opportunities to:

- Carry out deep strikes against other regional enemies (e.g., Saudi Arabia),

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33 Thomas L. McNaugher, "Ballistic Missiles and Chemical Weapons: The Legacy of the Iran-Iraq War," *International Security*, Fall 1990, p. 18.

34 Nolan, op. cit., p. 83.

35 McNaugher, op. cit., p. 18.

36 Hashemi Rafsanjani as quoted by McNaugher, op. cit., p. 6.

37 *Ballistic Missiles In Modern Conflict*, op. cit., p. 8.

38 Ibid., p. 9.

- Overcome operational deficiencies caused by a shortage of trained pilots and maintenance personnel,[39]
- Remove strike weapons from the control of politically unreliable elements (i.e., pilots),[40] and
- Deliver weapons of mass destruction.

6. Libyan Motives

Libya is generally motivated by a desire for international prestige. More specific Libyan motives for acquiring ballistic missiles appear to include desires for:

- Assured, long-range delivery of weapons of mass destruction,[41]
- Deterrence of U.S. and European military involvement in the region,[42]
- An instrument to terrorize European states by threatening their capitals, and
- A way to coerce regional neighbors into political concessions.

7. Egyptian Motives

Egyptian interest in ballistic missiles goes back to the early 1960s when Nasser recruited a team of German scientists to modify World War II V-2 missile designs for attacking Israel. Initially, Egyptian motives were a reinforcing mix of desires for:

- International prestige,
- Military parity with Israel, and
- Deterrence.

More recently, however, Egyptian interest in acquiring and upgrading its ballistic missile force was apparently motivated by an interest in deterring the unpredictable military ambitions of Libya's Colonel Qaddafi and concern about the potential renewed conflict with Israel if there were a new Arab-Israeli War.[43] Perceived success in Iraqi use of ballistic

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39 Nolan, op. cit., p. 85.

40 Ibid.

41 *Ballistic Missiles In Modern Conflict*, op. cit., p. 53.

42 Ibid., p. 54.

43 Geoffrey Kemp, *The Control of the Middle East Arms Race*, Carnegie Endowment for International Peace, 1991, p. 16.

missiles in the recent Gulf War may also have heightened recent Egyptian interest in upgrading its missile force.[44]

8. Indian Motives

The lure of international prestige is one of the primary drivers of India's quest for ballistic missiles. After the first test firing of the Agni IRBM, a leading Indian strategic analyst noted that "[its role] as a weapon is the least of its roles."[45] This same analyst went on to emphasize the importance of the Agni as a national "confidence builder."[46]

Ballistic missiles are also seen as a "manifestation of India's self-reliance" and as a rejection of "neo-colonialist mentality" which sees Western and Chinese possession of missiles as "stabilizing" and India's or Pakistan's as "destabilizing."[47] This was essential because no "self-respecting country" could accept the strategic threat posed by neighbors armed with ballistic missiles; i.e., first the People's Republic of China and then later Pakistan.[48] Thus, ballistic missiles were seen by Indian defense planners as a way of deterring regional rivals and, failing that, of retaliating.

Intermediate-range ballistic missiles like the Agni also, in the words of two Indian defense analysts, "raise the cost of intervention" in regional affairs to the superpowers.[49] This is because, as Indian observers noted darkly, the Agni IRBM has sufficient range to reach the U.S. military base at Diego Garcia.[50] Thus ballistic missiles are seen by India as a way of increasing its freedom of action in Southwest Asia and confirming India's status as a regional superpower.

India also has other reasons for embarking upon and continuing its ballistic missile programs. For example, technical difficulties in developing combat aircraft, especially for deep strike missions, "made a missile program inevitable."[51] India's interest in acquiring

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44 Emerson, op. cit., p. 12.

45 K. Subrahmanyam, as quoted in Mahnken and Hoyt, op. cit., p. 246.

46 Ibid.

47 Ibid. Also Amit Gupta, "Fire In The Sky: The Indian Missile Program," *Defense and Diplomacy*, October 1990, p. 46.

48 *Ballistic Missile Proliferation In The Third World*, op. cit., p. 11.

49 C. Raja Mohan and K. Sburahmanyam as quoted in Thomas G. Mahnken, "The Arrow and the Shield: US Responses to Ballistic Missile Proliferation," *The Washington Quarterly*, Winter 1991, p. 195.

50 Mahnken and Hoyt, op. cit., p. 252.

51 Amit Gupta, op. cit., p. 46.

missiles is also linked closely with its nuclear aspirations.[52] Finally, the perceived military successes of missiles in the Iran-Iraq war reinforced latent Indian interests in developing missiles.[53]

9. Pakistani Motives

The main reason for Pakistan's ballistic missile program is simple. According to Pakistan's Minster of State for Defense, ballistic missiles are an indispensible "antidote" for India's missiles.[54] Pakistani declaratory statements are more explicit. The purpose of missile deployment is to deter both enemy missile attacks and deep strikes by enemy aircraft.[55] The latter problem is especially troublesome for Pakistani defense planners because of their nation's lack of strategic depth and Pakistan's negative correlation of conventional forces *vis a vis* India.

Other Pakistani motives apparently include:

- Distrust of U.S. and Chinese alliance guarantees of its security in the event of a war with India,[56]
- Need for an assured deep strike capability against India,[57]
- Need for delivery of nuclear weapons,[58] and
- Requirements to offset numerical, technological, and operational advantages enjoyed by India's conventional forces.[59]

10. Afghan Motives

Ballistic missile employment patterns during the Afghan civil war suggest that Kabul primarily acquired missiles to punish and demoralize the insurgents.[60] However, the Afghan government also wanted missiles to discourage neighboring countries from

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52 Ibid.

53 Ibid., p. 45.

54 Navias, op. cit., p. 12.

55 "Ballistic Missile Proliferation In The Third World," op. cit., p. 12.

56 Mahnaz Ispahani, *Pakistan: Dimensions of Insecurity*, Adelphi Papers 246, International Institute of Strategic Studies, London, Winter 1989/1990, pp. 36-37.

57 Arnett, op. cit., pp. 155-156.

58 Nolan, op. cit., p. 89.

59 Ispahani, op. cit., p. 32.

60 Director of Central Intelligence William Webster as cited in "The Arrow and the Shield: US Responses To Ballistic Missile Proliferation," op. cit., p. 192.

providing materiel support and from offering safe havens to the rebels. Indeed, Afghanistan actually fired SCUD-Bs at Pakistan and subsequently threatened to escalate its strikes if Pakistan continued supporting Afghan guerrillas.[61]

11. North Korean Motives

Ever suspicious of foreign intentions, North Korea has long emphasized a policy of "chuche" or self-sufficiency especially in defense.[62] This emphasis on "chuche" has been greatly accelerated with respect to strategic weapons in the last couple of years with the declining credibility of the Soviet nuclear umbrella.[63]

The military logic of the North Korean ballistic missile program is clear. That is, the North Koreans desire to:

- Offset South Korea's technological advantages in conventional forces,[64]
- Have an assured deep strike capability into South Korea (the SCUD-B can cover most of South Korea),[65]
- Provide a delivery system for weapons of mass destruction,[66] and
- Deter American military involvement on the Korean peninsula in the event of war between the North and South.

North Korea has *economic incentives* as well. Given a crushing burden of 20 percent of gross national product going to defense, North Korea finds foreign military sales a way of lessening the missile portion of that burden.[67] Indeed, foreign investment in

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61 *Ballistic Missiles in Modern Conflict*, op. cit., p. 55.

62 John J. Fialka, "North Korean Nuclear Effort Tests U.S.," *Wall Street Journal*, November 14, 1991, p. 10.

63 Andrew Mack, "North Korea And The Bomb," *Foreign Policy*, Summer 1991, p. 88.

64 Ibid., p. 89.

65 Nolan, op. cit., p. 93.

66 Fialka, op. cit., p. 10.

67 Nolan, op. cit., p. 92.

North Korean missile R&D efforts (such as Libyan investment in a "SCUD-D" allegedly now in development) may be essential for future North Korean missile modernization efforts.[68] There has also been some speculation that North Korea might try to use the inherent threat of its missile and nuclear weapons programs as a "diplomatic tool" to squeeze economic and political concessions from its neighbors, especially Japan.[69]

12. Argentine Motives

Argentina claims its ballistic missile program aims at deterring other states like Chile and Brazil which are "still increasing their work on this type of project."[70] Without domestic missile programs, some claim that Argentina will be prevented "from achieving its own satellite delivery systems."[71] Thus, it will be subordinated "to the dictates of other countries."[72] Most observers, however, believe that profit is the chief motive underlying Argentina's missile program.[73] Indeed, Argentina reportedly received several hundred million dollars in hard currency for the now defunct Condor II program.[74]

13. Brazilian Motives

Brazil, too, claims that its primary military interest in developing rockets and ballistic missiles is to deter its neighbors. Additionally, ballistic missiles have been an integral part of Brazil's space program since the mid-1970s. To this end, Brazil has sought to build satellites and space launch vehicles as well as to provide space launch services to others.[75]

But as with Argentina, most observers believe that profit is Brazil's chief motive.[76] This is because, over the years, the sale of rockets and missiles to Third World countries has been an important source of foreign exchange. For example, Libya reportedly paid

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68 Emerson, op. cit., p. 12.

69 Fialka, op. cit., p. 10.

70 Former Argentine Defense Minister, Haracio Jaunarena as quoted in Robert Rudney "Argentina's Condor II Missile: Dead, Dying, or Waiting in the Wings?" *Armed Forces Journal International*, September 1991, p. 26.

71 Ibid., p. 26.

72 Ibid, p. 26.

73 Mahnken and Hoyt, op. cit., p. 254.

74 *Ballistic Missiles in Modern Conflict*, op. cit., p. 18.

75 Bailey, op. cit., p. 114.

76 Mahnken and Hoyt, op. cit., p. 254.

Brazil more than two billion dollars over five years to support the Orbita MB/EE program alone.[77] Brazil also made money by supplying Astros II missiles during the Iran-Iraq War.[78] The commercial nature of the Brazilian missile program is reinforced by the fact that it has gone into hibernation since foreign funding dried up.

C. FINAL OBSERVATIONS

At the most basic level, there is a deep seated emotional need simply to have missiles. This is because acquiring top-end military systems is seen as a normal part (and possibly even the badge) of overall modernization. Indeed, many Third World states see little difference between procuring missiles and 747 jetliners, Pizza Hut franchises, or mass transit systems since all are symbols of a "modern" nation.[79]

This emotional need is reinforced by the perception among Third World states that ballistic missiles are the acme of national power.[80] They believe that international prestige and influence are accorded to states with ballistic missiles. Indeed, a Third World state might well conclude from the example of the former Soviet Union that missiles, when mated with weapons of mass destruction, are all that is necessary to make a state a superpower. At the very least, they may turn a nation into a regional hegemon.[81]

Examination of specific states indicates that Third World nations acquire ballistic missiles to serve a number of other general purposes as well. These include desires to:

- Deter regional rivals,
- Increase autonomy of regional actions *vis a vis* the superpowers,
- Deliver weapons of mass destruction,
- Increase the war-fighting potential of their armed forces,
- Make money from foreign military sales either for the profit *per se* or to underwrite the cost of domestic weapons programs,

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77 *Ballistic Missiles in Modern Conflict*, p. 18.

78 Bailey, op. cit., p. 115.

79 Andrew Mack, "More Arms Less Stability: Nuclear, Chemical and Missile Proliferation in the Asia-Pacific'," Draft paper delivered at the Conference on Changing East-West Relations: Implications for East and Southeast Asia, Defense Intelligence College and United States Pacific Command, Camp H.M. Smith, Hawaii, April 22-24, 1991, p. 3.

80 Mahnken and Hoyt, op. cit., p. 246.

81 Michael T. Klare, "Wars In The 1990s: Growing Firepower In The Third World," *The Bulletin of the Atomic Scientists*, May 1990, p. 9.

- Offset technological or numerical advantages enjoyed by enemy conventional forces, and
- Reduce the economic burden of military programs by substituting missiles for other more expensive technologies like deep strike aircraft.

As the preceding discussion has demonstrated, there are multiple motivations for Third World states to acquire ballistic missiles. Often these individual motives reinforce each other (e.g., the desires for deterrence and delivery of weapons of mass destruction). For all of these reasons, the lure of ballistic missiles to Third World nations is unlikely to abate in the foreseeable future.

III. MOTIVATIONS FOR PRODUCING BALLISTIC MISSILES AND SPACE LAUNCH VEHICLES

A. INTRODUCTION

Despite the substantial financial burden of indigenous production of ballistic missiles and space launch vehicles, and the limited military utility of most early models, more and more nations are seeking indigenous production capabilities. There are already 18 nations with some ballistic missile production capability, and that number is expected to rise to 24 over the next 8 years.[82] There are also seven nations with the indigenous capability to produce space launch systems.[83] Indeed, the key question is no longer whether more countries will seek to produce such systems, but rather how many of them, which ones, and how soon?

Although our primary interest is the domestic production of ballistic missiles, it is hard to separate that capability from the manufacture of space launch vehicles. In part, this is because ballistic missiles and space launch systems are closely related in design and performance.[84] These missiles are also often developed and manufactured by the same people, in the same agencies, and/or in the same facilities.[85] The Director of India's Prithvi military missile program, for instance, formerly headed the SLV-3 (Space Launch Vehicle-3) project which launched India's first satellite.[86] In the case of Pakistan, the Space and Upper Atmosphere Research Committee is generally believed to be responsible for military systems as well.[87] Finally, ballistic missiles and space launch vehicles depend on many common technologies and hence there is considerable technology transfer from one area to

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82 Assistant Secretary of Defense (ISP) Stephen Hadley at a joint DoD/SDIO briefing on GPALS, February 12, 1991, cited by Lora Lumpe et al., "Third World Missiles Fall Short," *Bulletin of the Atomic Scientists*, March 1992, Note #1, p. 37.

83 Thomas G. Mahnken, "Why Third World Space Systems Matter," *Orbis*, Fall 1991, p. 563.

84 Janne Nolan, *Trappings of Power: Ballistic Missiles in the Third World*, Brookings Institution, Washington, D.C., 1991, p. 40.

85 Brian Chow, Gerald Frost, Rebecca Grant, *Third-World Missiles: Trends, Threats, Economics and Safeguards*, RAND, September 1991, Work Draft, WD-5502-USDP, p. 68.

86 W. Seth Carus, *Ballistic Missiles In Modern Conflict*, Praeger, New York, 1991, p. 25.

87 Ibid., p. 25.

the other. For all these reasons, we have chosen to treat missiles and space launch vehicles as a single problem in our examination of motivations to produce such systems domestically.

The following discussion breaks out motivations into three broad categories--national security, technical, and economic--for analytic convenience. Nevertheless, we recognize (and the reader should constantly keep in mind) that these motives are, in fact, interrelated and mutually reinforcing in practice. Indeed, the impact of the three categories working in tandem is much greater than the mere sum of the individual motives.

B. NATIONAL SECURITY MOTIVES

The desire for self-sufficiency in key defense areas is a very basic, very powerful drive in all national leaders. It transcends alliance structures, and hence non-aligned states like India and North Korea are as eager for domestic production of missiles as are Israel and Pakistan, which have close security ties with the United States. The basic drive for self-sufficiency also transcends national ideologies, belief structures, and forms of government. Consequently, the Iranian government of the Shah was just as interested in promoting self-sufficiency in military production of critical defense goods as are the leaders of the present Islamic Republic of Iran.[88] Also, democratic France is as keen on domestic missile production as are authoritarian North Korea and Iraq.

This basic drive apparently springs from two sources. First, national survival is equated with having the means necessary to defend the nation in a hostile world filled with enemies. Second, there is a fear (based on many historical examples) that outside suppliers will fail to deliver at the critical moment.

These two sentiments are captured in remarks by the Pakistan's Defense Minister on the importance of self-reliance:

> Because of our experience in the past, we have come to the realization that the equipment of our defense forces should be as far as possible locally manufactured so that, in our hour of need, we don't have to take a bowl and go begging.[89]

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88 "Iran Builds Its Strength," *Jane's Defense Weekly*, February 1, 1991, p. 158.

89 Roger Frost, "Pakistan's New Defense Minister on Missiles, Self-Reliance and Afghanistan," *International Defense Review*, No. 4, 1989, p. 427.

In the same interview, the Defense Minister went on to note that one can "sleep well at night" if his nation is making its own military hardware.[90] This is because, "Even if you only have a knife to defend yourself, if this knife is made by you, you know you can multiply the number you have by working overtime."[91]

As the remarks by Pakistan's Defense Minister suggest, many nations are driven to domestic production of missiles and space launch vehicles by a desire to reduce, if not eliminate, the vulnerability that inherently springs from dependency on foreign suppliers.[92] Doing so makes arms embargoes, threats to interrupt the flow of spare parts, restrictions on the use and resale of weapons, and outside attempts to influence their foreign and defense policies things of the past.[93] Thus, domestic production is seen as increasing national freedom of action with respect to defense issues.

Indigenous manufacture of missiles and space launch vehicles also has a number of practical logistical consequences as well. For one thing, as Pakistan's Defense Minister noted above, production runs can always be increased to meet a national emergency, provided that production is done in-country. The same may not be the case if the critical systems come from foreign suppliers, especially if those suppliers are also furnishing other, larger customers. Furthermore, in-country production reduces the time from factory to firing-line by eliminating long transit times that are often associated with foreign dependency. Lastly, domestic production eliminates the possibility of seizure of critical war materiel by third parties while enroute (as the United States recently threatened to do with a ship load of North Korean SCUD missiles bound for Iran after the Gulf War[94]).

Initiation of missile production (or the announced intention to export such technology) can also be a potent lever for achieving other defense objectives. For example in the 1970s, South Korea acquired access to advanced conventional military technology and permission to participate in F-5 fighter production in exchange for promising the United States not to develop long-range ballistic missiles.[95] More recently, Israel

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90 Ibid., p. 428.

91 Ibid., p. 427.

92 Andrew L. Ross, "Do-It-Yourself Weaponry," *The Bulletin of the Atomic Scientists*, May 1990, p. 20.

93 Ibid., p. 20.

94 Eric Schmitt, "North Korea Ship Delivers To Iran," *New York Times*, March 18, 1992, p. 12.

95 Janne E. Nolan, "Ballistic Missiles in the Third World -- The Limits of Nonproliferation," *Arms Control Today*, November 1989, p. 11.

allegedly sought increased military aid from the Bush Administration in return for not providing technical assistance to other countries' missile programs.[96]

In-country development, testing, and production of ballistic missiles and space launch vehicles allow countries to conceal technological weaknesses, to obscure operational parameters, and to deceive others about the capabilities of missiles available prior to the outbreak of war. For example, using a foreign satellite launch service means that others have an opportunity to examine your satellite, thereby gaining valuable technical intelligence about its capabilities and limitations. Domestic production of space launch vehicles forecloses that opportunity. The development, testing, and production of home-made missile variants often frustrate Western intelligence gathering as well. For example, Iraqi missile test facilities in Mauritania make close observation and interception of telemetry from missile tests difficult.[97] Such limitations then allow governments to spring technological surprises; e.g., the world first learned of Iraq's space launch vehicle when the Iraqi government showed the test firing on television.[98]

Denying adversaries and the superpowers intelligence about missile capabilities can pay important dividends. As former National Security Adviser McGeorge Bundy noted about nuclear weapons and the Gulf War, even the "possible existence" of certain weapons capabilities can have a powerful deterring effect on adversaries.[99] Uncertainties about range and payload of Iraqi-developed Al-Husayn missiles worried Allied commanders during Operation Desert Storm. Were the Al-Husayns armed with chemical warheads? Did they have nuclear warheads? How far could they reach? How reliable were they? All these questions complicated Allied operational planning (especially for identifying and destroying missile launch sites) during the Gulf War. In retrospect, that concern appears overblown since the chemical and nuclear capabilities of Iraqi missiles proved to be more modest than originally believed. Domestic modifications to existing missile systems thus make it harder for Western intelligence service to assess technological capabilities of such missiles accurately.

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96 Daniel Williams, "Israel Agrees to Limit Missile Data Transfers," *Los Angeles Times*, October 4, 1991, p. 4.

97 Kathleen C. Bailey, *Doomsday Weapons In The Hands Of Many*, University of Illinois Press, Urbana, 1991, p. 111.

98 Ibid., p. 111.

99 McGeorge Bundy, "Nuclear Weapons And The Gulf War," *Foreign Affairs*, Fall 1991, p. 83.

Such misjudgements are important because even modest changes in capabilities can have serious consequences for systems in the field. For example, increased booster size, greater range, and higher target approach velocities, coupled with poor engineering, resulted in the hybrid Al-Husayn missile breaking up upon reentry.[100] The resultant debris, in turn, forced Patriot missiles to discriminate between multiple targets, even though they were only designed to deal with single targets. According to U.S. Army spokesmen, such higher target velocities and the appearance of multiple targets forced changes in Patriot software.[101]

C. TECHNICAL MOTIVES

Technology push is as important in encouraging the domestic production of missiles and space launch vehicles as the pull of national security requirements. These technology motivations range from very practical concerns to more personal desires to experience the excitement of working on leading edge technologies.

Many governments believe that the public recognition achieved through producing ballistic missiles and space launch vehicles will enhance the nation's general technological reputation. This is because a nation's ability to produce advanced military systems is often equated with an advanced stage of industrial development in general.[102] South Africa, for instance, is specifically using rocket research to demonstrate their "high level of technological advancement" and, thereby, to place themselves on the same general industrial plain with the most technologically advanced Western nations.[103]

Production of missiles and space launch vehicles also contributes to industrial development in several very practical ways. For one, it exposes domestic industries to modern production and management techniques as well as provides experience using advanced equipment and materials.[104] (This concern is probably a primary driver in the Japanese and European Ariane space launch vehicle programs.) Secondly, some claim that

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100 "Scud Killer Patriot Missile Upgrades Expand Range," *Signal*, August 1991, p. 34.

101 Ibid., p. 34.

102 Thomas G. Mahnken and Timothy D. Hoyt, "The Spread of Missile Technology to the Third World," *Comparative Strategy*, No. 3, 1990, p. 246.

103 "Station Commentary," Johannesburg Domestic Radio Service, 0500 GMT, June 1, 1989, FBIS-AFR as quoted by Martin Navias, *Ballistic Missile Proliferation in the Third World*, International Institute for Strategic Studies, London, Adelphi Papers 252, Summer 1990, p. 11.

104 Nolan, "Ballistic Missiles in the Third World --The limits of Limits of Nonproliferation," op. cit., p. 11.

investments in domestic production of missiles and space launch vehicles make vital contributions to the economy through technology spinoffs.[105]

Domestic production of ballistic missiles also offers an alternative to the manufacture of other, more complex, defense technologies.[106] For example, many countries lack the technological skills and industrial infrastructure necessary to develop and build complex systems such as strike aircraft. Missile technology, by contrast, is much easier to master.[107] These circumstances therefore make missile development programs for some nations, like India, virtually "inevitable."[108]

Another major advantage of indigenous production is that its technology can be built upon.[109] Once basic (and originally foreign) missile and space launcher production is mastered, countries can begin to design and produce launchers that optimize their specific requirements (e.g., cost, range, payload, accuracy). The weapons development strategy of the Armaments Corporation of South Africa (AMSCOR) epitomizes such thinking by stressing the development and production of systems "for performing specific missions facing the [South African Defense Force]" rather than in creating technological novelty.[110]

Missile and space launch vehicle technology can also be built upon in another way. Indigenous technology can be bartered for weapons, expertise, or other technologies which would be *otherwise unattainable*.[111] Technology bartering is also attractive as a way of bypassing many internationally-imposed restraints on technology transfers.[112]

Such technology bartering arrangements are common among missile producers. Israel, for example, reportedly assisted South Africa's missile program, perhaps out of a desire to use South Africa's coastline as a missile test range.[113] In a similar fashion, Brazil and China are reportedly sharing technology to develop space launchers (including a four-

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105 Ibid., p. 11.

106 Amit Gupta, "The Indian Missile Program," *Defense and Diplomacy*, October 1990, p. 46.

107 For an overview of the relative ease of building ballistic missiles, see Azriel Lorber, "Tactical Missiles: Anyone Can Play," *The Bulletin of the Atomic Scientist*, March 1992, pp. 38-40.

108 Ibid., p. 46.

109 Ross, op. cit., p. 22.

110 E. Shtender, "Republic of South Africa Military Industry," *Zarubezhnoye Voyennoye Obozreniye*, No. 9, September 1990, p. 64.

111 Navias, op. cit., p. 24.

112 Ibid., p. 24.

113 Jeanne E. Nolan, "The Politics of Proliferation," *Issues In Science and Technology*, Fall 1991, p. 64. See also Navias, op. cit., p. 25.

stage solid-propellant system) for the export market.[114] Sometimes trades are not for better missile or launcher technologies; e.g., South Africa exploited its contacts with the transnational Space Research Corporation to obtain special technology needed to develop the G-5/G-6 series of 155mm howitzers.[115]

For all these reasons, the technological motive to acquire missile and space launcher production capabilities may not be just an end in itself. Instead it may be just the first step on a long road to many different ends.

D. ECONOMIC MOTIVES

Economic motivations are complex and seldom ends in themselves. More frequently, the economic aspects of missile production are important stimulants to production: (1) as sources of much-needed foreign exchange, (2) as ways of reducing the unit costs of systems by generating sufficiently large production runs to create economies of scale, and (3) as "seed" money for new projects. At other times, economic interests of the state may be irrelevant to people running development and production organizations--people striving primarily for personal gain.

Production for profit as a primary incentive for producing missiles and space launch vehicles is probably confined to Brazil. Indeed, Brazil makes little secret of the importance of foreign sales. Only 10 percent of Brazil's total defense industrial output stays in-country while 95 percent of its aerospace production goes abroad.[116]

The lure of earning much-needed foreign exchange, however, is a powerful incentive to many second-tier missile and space launch vehicle suppliers. This may be especially true for states like North Korea, China (and perhaps eventually Russia and Ukraine), which have few products foreign markets find attractive.[117] For such states, foreign exchange is an important end in itself, regardless of whether it really represents "profit."[118]

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114 Nolan, "The Politics of Proliferation," op. cit., p. 64.

115 Shtender, op. cit., p. 67.

116 Navias, op. cit., p. 24. See also Mahnken and Hoyt, op. cit., p. 254.

117 Navias, op. cit., p. 23.

118 Indeed countries with command economies like North Korea and China may have difficulty calculating "profit." This is because their domestic pricing structure for raw materials and services is artificial in that it does not really represent true market costs, but rather the priorities of national economic decision-makers. Therefore, in the true economic sense, such foreign exchange may not really be profit.

Clearly though, large sums can be earned through the sale of missile technology. North Korea, for example, is estimated to have made nearly one billion dollars over the past 5 years from selling SCUDs and other military equipment to Libya alone.[119] In another deal, North Korea sold $500 million worth of SCUDs to Syria in March 1991.[120] Similarly, China is estimated to have made a net profit of two billion dollars from selling nuclear-capable CSS-2 ballistic missiles to Saudi Arabia.[121]

Sometimes the foreign exchange factor stimulates indigenous weapons production in just the reverse fashion. That is, nations begin domestic production to staunch the hemorrhage of scarce foreign exchange that is going to purchase missiles.

The existence of international markets for missiles and space launch vehicles has other implications for nations considering domestic production. For one thing, foreign missile sales increase production runs thereby driving down per unit costs to the producer's military by creating economies of scale. This process also transfers amortized R&D costs to foreign customers. Exports can also offset the development costs of more advanced models and thus, to some extent, R&D becomes a self-financing process. Libyan financial assistance to the development of North Korea's SCUD-D is a classic example of this process.[122] China too seems to depend on similar "self-financing" mechanisms to fund at least part of its ballistic missile programs.

Dependence of second-tier missile producers on foreign sales to underwrite their domestic needs creates opportunities for customers to get into production themselves. As the number of sellers increase, it becomes easier for buyers to demand co-production as a condition of sale just as market conditions forced General Dynamics to allow co-production of F-16 fighters in Turkey. Given that the number of potential buyers for ballistic missiles has remained relatively constant and the number of sellers has in fact risen over the last 5 years, it is not surprising that nations like Iran, Syria, and Egypt now have the chance to negotiate for co-production rights.[123]

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119 Steen Emerson, "The Postwar Scud Boom," *The Wall Street Journal*, July 10, 1991, p. 12.

120 Ibid., p. 12.

121 William Triplett II, "China's Weapons Mafia," *The Washington Post*, October 27, 1991, p. C-3.

122 Emerson, op. cit., p. 12.

123 Bill Getz, "Iran-Syria Deal Revealed as Scuds near Gulf ports," *Washington Times*, March 10, 1992, p. 3. Joseph S. Bermudez, Jr., "Ballistic Missiles in the Third World--Iran's Medium-Range Missiles," *Jane's Intelligence Review*, April 1992, pp. 150-151. Emerson, op. cit., p. 12.

Finally, personal gain may be a powerful incentive for producing missiles and space-launch vehicles domestically, especially in China. Military industry here is dominated by relatives of top Chinese Communist Party officials who channel foreign sales of ballistic missiles and space launch vehicles through specially chartered trading companies like the China Great Wall Industry Corporation.[124] Some observers, like former U.S. Ambassador to China James Lilley, claim that the entire Chinese defense industrial system is "driven by greed, and is run by high-level cadres' kids who have clout and power."[125] According to Ambassador Lilley, these people are motivated primarily by interests in "golden Rolls-Royces, wet T-shirts and foreign bank accounts."[126]

Other observers like William Triplett II (a senior staffer of the U.S. Senate's Foreign Relations Committee) claim that a portion of the profits from foreign military sales goes directly to the families that run these Chinese trading companies. They, in turn, use the money to: (1) finance foreign travel, (2) pay for their children's education abroad, (3) buy foreign luxury items like cars and appliances, and (4) create "rainy day" funds in foreign banks.[127] The potential funds available to individuals in this way are staggering. For example, if these middle men kept only 5 percent of the two billion dollar profit from the sales of CSS-2s to Saudi Arabia, they still would have garnered $100 million.[128]

As we said at the beginning of this section, economic incentives are probably not enough by themselves to influence nations to begin indigenous production of ballistic missiles and space launch vehicles. Nevertheless, economic considerations are powerful reinforcements to domestic production for technical and national security reasons.

E. OVERALL CONCLUSIONS

Each of the three basic motives--national security, technology, and economics--is a powerful force in its own right behind the drive of nations to develop and produce ballistic missiles and space launch vehicles indigenously. They are at the same time, however, all three interrelated and mutually reinforcing. Indeed, it may be the synergism between the individual motives that finally persuades national leaders to undertake domestic production despite the substantial financial burden and limited utility of most initial systems.

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124 "Merchants of Death," *Newsweek*, November 18, 1991, p. 38.

125 Ambassador James Lilley, as quoted in "Merchants of Death," op. cit., p. 38.

126 Ibid., p. 38.

127 Triplett, op. cit., p. C-3.

128 Ibid., p. C-3.

There have always been strong desires for national self-sufficiency in key defense goods and technological advancement. Until recently, however, these were not enough to push many nations into indigenous production of ballistic missiles and space launch vehicles. Recent changes in the international arms market (especially the proliferation of sellers), coupled with the growing military importance nations attach to ballistic missiles in the wake of the Gulf War, may change the traditional equation forever. That is, nations now have increased military incentives to acquire missiles at the same time that market forces allow more nations to pressure sellers into granting co-production to the buyers. These new realities, combined with traditional motivations, probably mean more and more nations will seek to manufacture missiles and space launch vehicles in future.

These trends have important implications for U.S. missile defense programs. Indigenous production probably means the rapid proliferation of multiple *hybrid* missiles/space launch systems as nations tailor future systems to their individual requirements and capabilities. This, in turn, complicates the job of SDIO architects and system designers by expanding the range of technological possibilities they must design missile defenses to meet.

IV. THIRD WORLD BALLISTIC MISSILE TARGETING STRATEGIES

Third World ballistic missile targeting strategies are shaped by a number of broad forces. Mission requirements of Third World defense planning staffs are the first, and probably the most important, driver of missile targeting strategies. Ultimately, however, target selection is shaped by more than just military requirements. Final target lists are influenced by a host of constraints as well. These include factors such as: (1) the technical capabilities of warheads and delivery vehicles, (2) lack of real-time, long-range reconnaissance capabilities, (3) political considerations, (4) geography, and (5) lessons learned from previous regional conflicts. Consequently, it is a confluence of mission drivers and constraints that shape Third World targeting strategies.

The target selection process is dynamic. Hence Third World ballistic missile targeting strategies will be remain evolutionary in nature for the near-term. (As technical capabilities become more robust, Third World targeting options increase.) This means that Western defense planners should expect considerable growth and modification in Third World objectives over the next decade in conjunction with advances in Third World missile capabilities and inventories.

For analytic convenience, the subsequent assessment breaks out the discussion of potential targets for Third World ballistic missile forces into two broad categories: (1) "strategic" and (2) "war-fighting". The former category emphasizes achieving broadly defined political/economic ends. Consequently, attacks on "strategic" targets offer the promise of affecting the overall course or outcome of a war. Attacks on "war-fighting" targets, by contrast, concentrate on more limited military-operational objectives. As such, strikes against targets in the "war-fighting" category usually focus on tactical ends like shaping the course of a campaign or a single phase of the war.

A. "STRATEGIC" TARGETS

1. Cities

Cities are a top Third World targeting priority for many of the same reasons that drove U.S.-Soviet interest in countervalue targeting during the early days of the Cold War. That is, cities are high value objectives. They are fixed sites, whose location can be determined easily in advance. They can be attacked with crude, grossly inaccurate missiles. These incentives for Third World states to target enemy cities are probably reinforced by historical experience. That is, some Western military analysts of the Iran-Iraq War publicly argue that missiles are "highly effective when attacking large urban centers."[129]

Given these considerations, it is not surprising that Third World states have consistently attacked (or threaten to strike) cities with ballistic missiles. For example, both sides struck each other's cities during the Iran-Iraq war. Similarly, Iraq went after Saudi and Israeli cities during the recent Gulf War. Interest in targeting cities with missiles is a long-standing one; e.g., Syria attacked the Israeli cities of Haifa and Nahariva with FROG missiles as far back as the 1973 October War.[130]

There have been strong hints that other nations too would go after an enemy's cities in certain circumstances. For example, rumors have abounded for years that Russian cities were prime targets of Israeli ballistic missiles if the Russians intervened in Arab-Israeli disputes.[131] Regardless of the truth of these rumors, the Russians clearly believed them. For example, a Radio Moscow broadcast (in Hebrew) just after the successful testing of the Israeli Jericho II in 1987 warned that continued development of the Jericho II might lead to "consequences that [Israel] could not possibly handle."[132] Using missiles for deep strikes has also been a long-standing interest of the Egyptians and Syrians.[133] China too emphasizes countervalue targeting with its strategic missile forces.

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129 An unnamed Western military analyst as quoted by Thomas L. McNaugher, "Ballistic Missiles and Chemical Weapons," *International Security*, Fall 1990, p. 5.

130 C.J.D. Thomas, "How Israel Saw Iraq During The Gulf War," *RUSI Journal*, Winter 1991, p. 39.

131 Alexander Cockburn, "Beat The Devil", *The Nation*, October 28, 1991, p. 507.

132 Thomas G. Mahnken and Timothy D. Hoyt, "The Spread of Missile Technology to the Third World," *Comparative Strategy*, NO. 30, 1991, p. 249/

133 Joseph S. Bermudez, Jr., "Ballistic Missiles in the Third World--Egypt and The 1973 Arab-Israeli War," *Jane's Intelligence Review*, December 1991, p. 532. See also Joseph S. Bermudez, Jr., "Syria's Acquisition of North Korean 'Scuds'," *Jane's Intelligence Review*, June 1991, p. 249.

Ballistic missiles employment patterns both in the Iran-Iraq War and the recent Gulf War indicate that capital cities are especially attractive targets to Third World military planners. Although Iraq used missiles against six different Iranian cities between February and April of 1988, 70 percent of those missiles were aimed at Tehran.[134] Between January 17 and February 2, 1991, Iraq repeated this emphasis on enemy capitals by aiming 50 percent of its missile launches at Riyadh.[135]

The priority attached to enemy capitals probably springs from two sources. First, attacking an adversary's capital has great symbolic and shock value.[136] But perhaps even more important, the capitals of many Third World nations are the administrative hubs of the entire nation--take out the capital and you paralyze society. (Both Damascus and Baghdad are prime examples of this situation.)

Although cities are high leverage strategic targets, some cities may be of such high value that they become virtually untouchable. Mecca and Jerusalem for instance have deep religious significance to the Arab masses. (Saudi Arabia, for example, has long made use of this emotional attachment to Mecca as a device for modifying the behavior of nations with large Moslem populations; e.g., the Saudis would increase or limit the number of visas granted to aspiring pilgrims, based on the behavior of their governments.) Indeed the religious value attached to these places may be so high that use of missile-delivered weapons of mass destruction by any Arab country is probably counter-productive. That is, the attacker would probably face a domestic political backlash of such magnitude that it could undermine his overall war effort. (Such reasoning probably played a significant role in Baghdad's decision not to fire missiles at either Mecca or Jerusalem during the Gulf War.[137]) Attacks on Mecca by non-Moslems could be equally counterproductive--they might spur Arab adversaries into making more furious offensives or might bring other nations into the war that had previously remained neutral.[138]

It is tempting to assume that the emphasis on countervalue targeting in Third World targeting strategies will decline over time as more accurate ballistic missiles become

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134 W. Seth Carus and Joseph S. Bermudez, Jr., "Iraq's Al-Husayn Missile Program," *Jane's Soviet Intelligence Review*, June 1990, p. 242.

135 Joseph S. Bermudez, Jr., "Iraqi Missile Operations During 'Desert Storm'", *Jane's Intelligence Review*, March 1991, p. 133.

136 McNaugher, op. cit., pp. 6-11.

137 Eric H. Arnett, "Choosing Nuclear Arsenals: Prescriptions and Predictions for New Nuclear Powers," *Strategic Studies*, September 1990, p. 156.

138 Ibid., p. 156.

available; i.e., that Third World practices will mirror those of the U.S. and the former Soviet Union. That may not be the case however. For as a ranking member of the Israel Ministry of Science and Technology points out: "Some potential users believe they need missiles not to use as efficient military weapons but as tools of terror and mass destruction."[139] Consequently, some nations may not be able to afford nor be interested in acquiring more accurate, more militarily useful missiles.

In other cases, interest in countervalue targeting was never purely the result of the technical limitations of the missiles. The leaders of some nations like China have long argued to win a war one must destroy the people because it is the people, in their view, that are the paramount element of the state. From this perspective, targeting cities will continue to be very important regardless of the capabilities of the delivery systems.

2. Economic Targets

Ballistic missiles can also be used both directly and indirectly against an adversary's economy. Prime economic targets can be destroyed outright. Alternatively, threats of missile strikes (or of more massive strikes) can sow sufficient terror among the population to chill the economy.

Economic targets are attractive because they are essential to any nation's basic, long-term well-being as well as to its more immediate war-fighting potential. For these reasons, it is not surprising that destruction of the Iranian oil terminal on Kharg Island was a major Iraqi strategic objective during the Iran-Iraq War.[140] Similarly, centralized Syrian grain storage facilities or the handful of deep irrigation wells in Israel are attractive potential targets because of the leverage the attacker gets from either threatening their destruction or actually striking them.

Just terrorizing an enemy's population with missile strikes can also produce catastrophic economic consequences. For example, Israel paid a high price for SCUD attacks during the Gulf War, even though the physical damage was minor. The threat of gas attacks against urban centers forced the Israeli government to declare a State of Emergency ordering people to stay at home. The Bank of Israel estimates that this led to

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139 Azriel Lorber, Principal Assistant to the Director General of Israel's Ministry of Science and Technology, "Tactical Missiles: Anyone Can Play," *The Bulletin of the Atomic Scientists*, March 1992, p. 38.

140 Efraim Karsh, *The Iran-Iraq War: A Military Analysis*, International Institute for Strategic Studies, Adelphi Papers 220, Spring 1987, p. 37.

lost output totally $400 million for a six-day period in January of 1991.[141] Israel's indirect economic losses resulting from terror engendered by missile attacks in the Gulf War mirrors Iran's experience during the Iran-Iraq conflict. According to reports from Tehran, Iraqi missile attacks caused at least 25 percent of Tehran's ten million people to flee the city and forced many of those remaining to radically alter their daily lives.[142] Such massive human dislocation must have translated into severe economic losses as well.

3. Ethnic Targeting

Some Third World nations may also be tempted to target ethnically and geographically discrete groups. Such "ethnic targeting" strategies (as originally conceptualized in the United States) rest on the premise that an oligarchy's control over its empire can be undermined by selectively attacking its ethnic powerbase, especially if that empire exhibits considerable ethnic diversity.[143] Accordingly to this reasoning, restive republics, regions, or groups can then breakaway once central control is loosened.[144]

Although rejected by U.S. decision-makers, ethnic targeting may find more appeal in the Third World. This is because most Third World states are rife with severe ethnic, religious, a cultural divisions. Additionally, many Third World leaders consciously pit one group against another to ensure their continued control. Some leaders go even farther and draw primarily upon one group as their power base. Given such conditions (and recent world-wide spread of virulent forms of nationalism), ethnic targeting may become increasingly attractive missile targeting strategy.

Indeed, some nations may be already contemplating an ethnic targeting option. For example, there has been widespread speculation in the Israeli press that their government considered launching selective retaliatory nuclear strikes against Tikit (the regional and ethnic power base of Saddam Hussein) if Iraq used gas weapons against Israel.[145] Similarly, Yugoslavia's Federal (and Serbian dominated) Army threatened to use FROG surface-to-surface ballistic missiles against selected targets in the ethnically distinct

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141 Thomas, op. cit., p. 40.

142 "Iraq's Al-Husayn Missile Program," op.cit., p. 243.

143 Desmond Ball, "Toward a Critique of Strategic Nuclear Targeting," in *Strategic Nuclear Targeting*, ed. Desmond Ball and Jeffrey Richelson, Cornell University Press, Ithaca, 1986, pp. 28-29.

144 Ibid., p. 29.

145 Robert E. Harkavy, "After the Gulf War: The Future of Israeli Nuclear Strategy, "*The Washington Quarterly*, Summer 1991, p. 161.

breakaway republic of Croatia in November of 1991.[146] According to a spokesman for the Croatian National Guard, these threats were designed to exert "psychological pressure" against the Croats.[147] Additional support for the potential appeal of ethnic targeting is offered by Baghdad's use of chemical weapons to suppress rebellious Kurds in Northern Iraq.

4. Nuclear Reactors

Third World nuclear reactors are becoming increasingly attractive strategic targets for several reasons. First, destroying nuclear reactors offers a way of ending, or at least slowing, the nuclear weapons program of regional rivals. Second, strikes against nuclear reactors permit a nation to achieve the effects of weapons of mass destruction while only using conventional warheads.[148] Besides the initial explosion, attacks against reactors also threaten to contaminate significant portions of a target nation with wind-borne fallout.[149]

Israel's air strike against Iraq's Osirak reactor in 1980 was the first example of the strategic priority attached to destroying reactors. More recently, Iraq attempted to use SCUDs against Israel's Dimona reactor--long suspected of being part of Israel's nuclear weapon's program.[150]

Post-war United Nations difficulty rooting out Iraq's nuclear weapons program (even under the most ideal circumstances) may encourage more nations to add nuclear reactors to their target lists. The Russians certainly appear to believe this is happening. That is, the Russians were handing out advertising brochures at the August 1992 Moscow Air Show offering to sell "guided aerial bombs" capable of destroying "nuclear fuel storage" facilities.[151]

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146 "Army Threatens to Fire Missiles at Crotia," *The Philadelphia Inquirer*, November 9, 1991, p. 4.

147 Ibid., p. 4.

148 Petr Afanasyev and Nikolay Panyukov, "So The Two Modes of Thinking Have Met...," *Rabochaya Tribuna*, February 19, 1991, as translated in JPRS-UMA-91-008, March 19, 1991, p. 20.

149 Bennet Ramberg, "Before We Bomb Iraqi Nuclear Sites," *The Washington Post*, August 11, 1991, p. C-7.

150 Ibid., p. C-7.

151 "Guided Aerial Bomb KAB-1500L-Pr", A technical specification procure distributed at the 1992 Moscow Air Show by GNPP Region Moscow.

5. "Influence" Targeting

Third World nations may also engage in what, for want of a better term, might be called "influence" targeting with ballistic missiles. The aim of this strategy is to affect the actions of major Western powers by signaling a nation's intention to fire missiles at a regional neighbor. The objective of this is convince the West either to apply or withhold its influence in regional conflicts.

Third World regional rivals seldom have sufficient long-range reconnaissance capabilities to detect when an adversary's missiles and nuclear forces have gone on alert. The former Soviet Union, the United States, and its allies do, however, have the requisite capabilities to detect changes in the alert posture of Third World strategic forces. Nations recognize this capability and have sometimes used it to their advantage in times of extreme crisis or during periods which threatened national survival.

Israel, for example, has apparently used this technique several times in the past. That is, Israel put its strategic nuclear forces on alert knowing that only the U.S. and the former Soviet Union could recognize the change in alert status. With the tide of battle going badly against it in 1973, Israel heightened the readiness posture of its strategic nuclear forces to convince the United States to deliver the extra conventional weapons Israel had been requesting.[152] It also appears that Israel again upgraded the alert status of its strategic forces late in that same war as warning to the Soviet Union not to intervene militarily.[153]

Israel may also have used a variant of this strategy during the recent Gulf War. That is, Israel moved its own nuclear-armed missiles out into the open and pointed them east in reaction to Iraq's missile attacks on Israeli cities.[154] Iraq lacked the reconnaissance capabilities to recognize that this was taking place. The Soviet Union, Iraq's former mentor, did have such capabilities. What is more, the Soviet Union kept communication channels open to Baghdad throughout the war. Therefore, it would appear that Tel Aviv was trying to get the Soviet Union to use its influence to restrain Iraq.

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152 "The World's Worst-Kept Secret," *The Economist*, November 1, 1991, pp. 111.

153 Ibid., p. 111.

154 Ibid., p. 111.

B. "WAR-FIGHTING" TARGETS

1. Ballistic Missile Forces

Suppressing an adversary's strategic offensive capabilities, especially ballistic missile forces, is probably a major Third World targeting priority. Intuitively, ballistic missiles and their associated launch complexes are potentially such high value assets that it is difficult to imagine them not being priority targets. Also there is limited evidence that, when possible, Third World states will use surface-to-surface missiles to neutralize an enemy's missiles. According to one Iranian report, its Revolutionary Guards employed "medium-range missiles" (probably Oghabs) to destroy an Iraqi "mobile surface-to-surface missile pad" near the Tib River.[155]

For the present, however, targeting enemy ballistic missiles is probably more of a wish than a reality for most Third World defense planners. As the Allies learned in Operation Desert Storm, mobile missiles (the kind most often employed in the Third World) are very difficult to detect for even technologically advanced nations. The detection problem is orders of magnitude worse for Third World states. Also a lack of sufficient warning of an impending attack, or political circumstances, also makes it more difficult for Third World states to target each others's missiles.[156] Finally, even if successfully located, it may be difficult to actually destroy missiles if they are housed in hardened shelters (as they are in Israel) or if they are kept in caves (as they are in North Korea).

Although most Third World nations are probably unable to implement counterforce targeting at present, there are a few nations that may have at least rudimentary capabilities to do so already. The first obvious candidate is China which has a more robust missile forces than most other Third World states. Israel and India may soon join China in having the ability to target enemy missile forces by virtue of their more advanced missile systems, their domestic space satellite programs, (and the vastly improved reconnaissance capabilities that come with satellites).

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155 Tehran Domestic Service (Persian), March 4, 1988 as translated by the Foreign Broadcast Information Service, *Daily Report: Near East and South Asia*, March 4, 1988, p. 56.

156 W. Seth Carus, *Ballistic Missiles In Modern Conflict*, Praeger, New York, 1991, p. 42.

2. Large Area Military Targets

Airfields are particular attractive targets for Third World military planners for a variety of reasons.[157] Airfields are large targets. They are fixed, easily located sites. Airfields are also attractive because they house lots of high-value tactical assets. Finally, air bases are not well defended against missile attack targets as a rule and thus can be easily attacked by missiles with even relatively poor CEPs.

Syria probably represents one of the chief proponents of using missiles against air bases. As early as 1973, Syria showed an interest in using short-range surface-to-surface missiles to attack airbases in northern Israel. Ultimately, the desire to redress Israel's traditional aircraft advantage grew to the point where it became one of the main drivers of Syria's missile program.[158] Many senior Third World military leaders (as former students in Soviet military schools) were also exposed to Soviet ideas about using SS-23s and SS-20s against NATO airfields.

Large military bases, especially those that also serve as major staging areas, are also potentially attractive targets to many Third World nations. During the Gulf War, Iraq repeatedly attacked Allied facilities at Dhahran with SCUDs.[159] Similarly, Israeli military mobilization points have long been thought to be a target for Syrian missiles.[160] Targeting military bases is also part of Libya's strategy as well; e.g., Libya launched two SCUD-Bs at a U.S. military base of the coast of Italy in response to the U.S. air raid against Tripoli in 1986.[161] Indian observers have also hinted at their interest in targeting military bases. They have noted, for example, that the Agni IRBM has sufficient range to strike the U.S. naval base and staging area at Diego Garcia.[162]

3. Troop Concentrations

Ballistic missiles, especially short-range missiles, potentially have considerable utility against troop concentrations. These missiles are doubly effective when armed with weapons of mass destruction.

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157 W. Seth Carus, "Trends and Implications of Missile Proliferation," October 15, 1991, p. 20.

158 "Syria's Acquisition of North Korean 'Scuds'," op. cit., p. 249.

159 "Iraqi Missile Operations During 'Desert Storm'," op. cit., p. 133.

160 Mahnken and Hoyt, op. cit., p. 250.

161 Ibid., p. 194.

162 Ibid., p. 252.

Third World military planners have long recognized the tactical potential of missiles for neutralizing enemy troop concentrations. Iraq, for example, is apparently interested in using missiles with chemical warheads against troop concentrations simultaneously with the initiation of offensive ground actions.[163] China too has displayed an interest in using short-range missiles to deliver nuclear strikes against enemy troop concentrations.[164] Indeed, the Chinese have gone so far as to stage simulated tactical nuclear airbursts against enemy troop concentrations during military exercises.[165] Apparently India too intends to target missiles against enemy troop concentrations since it is reportedly developing five different conventional munitions for its short-range Prithvi missile--each of which is ideal for destroying troops or armored vehicles.[166]

C. FINAL OBSERVATIONS

As noted in the beginning of this paper, Third World missile targeting strategies are dynamic and evolutionary in nature. Thus, we should expect some change in the relative priority attached to particular targets sets as the technical capabilities of their delivery systems improve. Nevertheless, Third World targeting strategies will not be dictated solely by technology. Consequently, countervalue targeting will remain a cornerstone of many Third World targeting strategies even though present technological imperatives to do so will decline over time.

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163 Harvey J. McGeorge, "Iraq's Secret Arsenal," *Defense and Foreign Affairs*, January/February 1991, p. 9.

164 Richard Fieldhouse, "China's Mixed Signals on Nuclear Weapons," *The Bulletin of the Atomic Scientists*, May 1991, p. 37.

165 Ibid., p. 37.

166 "Trends and Implications of Missile Proliferation," op. cit., p. 20.

V. IMPLICATIONS OF THE GULF WAR FOR THIRD WORLD BALLISTIC MISSILE OPERATIONS

The Allied victory in the Gulf War last year will significantly influence how nations around the world structure, equip, and employ military forces in future. This is because many defense analysts see what happened in the Persian Gulf as seminal event. (Some even claiming that its impact will rival that of the battle of Agincourt or the Spanish Civil War.)

The Chairman of the U.S. Joint Chiefs of Staff has called the Gulf War a "change agent"--one which has "changed forever the parameters of the Defense debates".[167] The Russians also think that the Gulf War will result in the drawing of "serious conclusions" and "useful lessons" about the entire "spectrum of military structures".[168] Indeed, some Russian military theorists emphasize that future Russian forces must be planned "through the prism of the Persian Gulf."[169] In a similar vain, the Syrian Defense Minister sees the war as "a major testing ground for the quality of armaments".[170] The war even affected the North Koreans who allegedly went into "Gulf shock" over its outcome.[171]

There are many reasons for such extreme interest in studying the Gulf War. First, the war was a "testing ground" for a wide spectrum of advanced technologies and innovative military operational concepts.[172] The war, as such, provides a prototype of the future military operations--a future which works.[173] Second, as an allied operation under

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167 General Colin L. Powell, "Dealing With The Changes", *U.S. Naval Institute Proceedings*, July 1992, p. 11.

168 Major General Nikolay Kutsenko, "'Useful Lessons' To Be Drawn", *Tass*, March 1, 1991, FBIS-SOV-91-042, March 4, 1991, p. 42.

169 Mary C. Fitzgerald, "The Soviet Image of Future War: 'Through the Prism of the Persian Gulf'", *Comparative Strategy*, October-December 1991, p. 393.

170 General Mustaf Talas as quoted by Major R. Mustafin, "We Are Continuing Cooperation", *Krasnaya Zvezda*, February 8, 1991, p. 3, as translated in FBIS-SOV-91-027, February 8, 1991, p. 15.

171 Charles Q. Cutshaw, "Lessons From The Gulf--A Time For Caution", *Jane's Intelligence Review*, July, 1991, p. 314.

172 Major General N. Kutsenko, "Lessons of Combat Operations", *Izvestiya*, February 28, 1991 as translated in FBIS-SOV-912-042, March 4, 1991, p. 42.

173 Fitsgerald, op. cit., p. 393.

Untied Nations auspices, the Gulf War drew many nations into the fighting and so provided them with first-hand experience. This is important because personal involvement makes more vivid impressions than just reading about the experiences of others. Third, the Gulf War was televised extensively so even non-participants could follow the progress of military operations in almost real time. What is more, that coverage had "a magical effect" on viewers.[174]

All of these factors have created a world-wide "rush to judgment" about the lessons of this conflict.[175] Indeed, some Western defense journals believe that Desert Storm "may be the most analyzed conflict in history."[176] Clearly, the goal of such analyses are to determine what went right and what went wrong with an eye toward improving performance in the next conflict. Implementing these lessons, however, may require equipping, structuring, or employing forces differently for future military actions.

Despite almost universal interest in drawing lessons about the performance of military equipment and operational concepts in the Gulf War, one must be very wary in doing so.[177] First off, all wars are unique in terms of circumstances and so it is difficult to generalize the experience of one conflict since the next war may occur in an entirely different context. Second, there is a danger of drawing the wrong conclusions.[178] Consequently, all attempts to extrapolate about future conflicts based on Desert Shield and Desert Storm are "fraught with danger".[179]

Such cautions notwithstanding, it is still useful to study what lessons Third World nations might learn about the use of ballistic missiles and their interplay with missile defenses. In part, this is a useful exercise because military planners from those nations will do so regardless of possible pitfalls. Additionally, it is worth trying to divine the potential implications of Persian Gulf operations for Third World states as a contingency planning exercise for the West. With this in mind, we will now turn to identifying possible lessons.

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174 Theodore A. Postol, "Lessons of the Gulf War Experience With Patriot", *International Security*, Vol. 16. NO. 3, Winter 1991/92, p. 119.

175 James Blackwell, Michael J. Mazarr, and Don M. Snider, *The Gulf War: Military Lessons Learned*, Interim Report of the CSIS Study Group on Lessons Learned from the Gulf War, The Center for Strategic and International Studies, Washington, D.C., p. V.

176 Mackubin Thomas Owens, "Lessons Of The Gulf War", *Strategic Review*, Winter 1992, p. 50.

177 Bobby R. Inman, Joseph S. Ney, Jr., William J. Perry, and Roger K. Smith, "Lessons From The Gulf War", *The Washington Quarterly*, Winter 1992, p. 57.

178 Sir Michael Howard as quoted by Owens, op. cit., p. 50.

179 Owens, op. cit., p. 51.

LESSON 1: BALLISTIC MISSILES HAVE GREAT STRATEGIC VALUE

Although limited in range, accuracy, and payload, Iraqi SCUD missiles had a significant strategic effect. Indeed, SCUDs were the *only* strategically significant weapons employed by Iraq during the war.

Saddam Hussein saw his SCUDs as his most reliable means of inflicting a painful blow on the enemy and, in the process, of terrorizing Saudi and Israeli cities.[180] The ability of these strikes to instill terror--an impact magnified by nightly television coverage around the world--had important political ramifications. That is, SCUD raids threatened to provoke the kind of Israeli retaliation that might have splinted the fragile coalition of Western and Arab states. If successful, this political stratagem would have negated the military success the Allies were achieving on the battlefield. Therefore, ballistic missiles offered Iraq one of the few military tools available for achieving one of its main war objectives--fragmenting the Allied coalition.[181]

SCUDs also provided Saddam Hussein an important propaganda tool for going over the heads of Arab governments and appealing to anti-Israel sentiments of their peoples. Iraq could claim a major political victory by bringing the war directly into Israel--something no other Arab leader had accomplished in previous Middle Eastern wars. This, in turn, made Saddam Hussein a cult hero to "the Arab street", especially to exiled Palestinians in Jordan. It also laid the foundations for him to claim later (provided the fighting was not too one-sided) that Iraq had won important "victories" during the Gulf War. This, in turn, might elevate Saddam to political leadership of the Arab masses in the same way Egypt's Nasser was after he lost the 1967 Arab-Israeli War.

SCUDs also had an important strategic military impact as well. Difficulty in silencing the politically damaging SCUD attacks forced Allied commanders to devote an unexpectedly large number of air sorties to finding and destroying mobile missile launchers. Indeed, SCUD hunting absorbed between 10 to 25 percent of Allied air sorties during the war.[182] (This represents three times the effort originally anticipated by military planners.[183])

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180 Lawrence Freedman and Efraim Karsh, "How Kuwait Was Won: Strategy In The Gulf War", *International Security*, Fall 1991, p.10.

181 Ibid., p. 8.

182 Freedman and Karsh, op. cit., p. 16.

183 Group Captain Niall Irving, "The Gulf Air Campaign--An Overview", *RUSI Journal*, February 1992, p. 12.

The demands of the "Great SCUD Chase", coupled with bad weather, also stretched the overall air campaign by a third.[184]

Third World nations have apparently taken to heart our first, and "starkest", lesson of the Gulf War--SCUDs have great strategic value as terror weapons.[185] Consequently, sales of SCUDs in the Middle East have "boomed".[186] Syria, Libya, and Iran have all sought additional SCUDs from North Korea since the war.[187] Unconfirmed press reports last year speculated about possible Egyptian interest in acquiring North Korean SCUDs as well. All of this leads some Western analysts to conclude that tactical ballistic missiles have emerged from the war as the "long-range strike weapon of choice", especially in the Middle East.[188]

LESSON 2: PRESENT THIRD WORLD MISSILES HAVE LIMITED MILITARY VALUE

Despite the strategic impact of SCUD missiles, they had little tactical success. Missile strikes inflicted few military casualties, caused only minor inconveniences to air field operations, and failed to inhibit major Allied initiatives. In fact, General Schwarzkopf even went so far as to say that Iraqi missile strikes were "militarily insignificant".[189]

However, the "echo of [Allied cruise] missile thunder in the desert" may well suggest to Third World military planners that their future ballistic missiles could play a more militarily significant role.[190] Improved Third World missile accuracy, range, and payload (coupled with better reconnaissance) offer the Third World commanders the prospect of greatly increased ballistic missile effectiveness in the future, eventually perhaps matching that of Allied cruise missile operations in the Gulf War. Such upgrades could put significant military pressure on future wartime opponents, including Western intervention/peacekeeping forces.

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184 Rich R. Smith, "Allies' Scud Hunt Came At A Cost", *The News and Observer*, January 14, 1992, p. 1.

185 Duncan Lennox, "The Shield Turns Skyward", *Jane's Defense Weekly*, January 11, 1992, p. 49. Steven Emerson, "The Postwar Scud Boom", *The Wall Street Journal*, July 10, 1991, p. 12.

186 Emerson, op. cit., p. 12.

187 Ibid., p. 12.

188 Blackwell, et. al., op. cit., p. 17.

189 Stewart M. Powell, "SCUD War, Round Two", *Air Force Magazine*, April 1992, p. 50.

190 Colonel General Rakhim S. Archurin, Commander of Soviet Anti-Aircraft Forces, quoted by David Markov, "Lessons from the Gulf and Their Impact on the Soviet Military," March 21, 1991.

LESSON 3: MOBILE MISSILES ARE SURVIVABLE, BUT NOT IMMORTAL

Allied problems locating and destroying SCUDs demonstrated the survivability of small mobile missile launchers.[191] The Chairman of the U.S. Joint Chiefs of Staff, for instance, acknowledged to the press early in the war that the SCUD hunting campaign was "taking more of an effort on our part than we had anticipated".[192] Subsequently, the U.S. Air Force Chief of Staff admitted that SCUD suppression "posed one of the air campaign's most serious challenges" and that mobile missiles "were never fully suppressed".[193]

Others make even harsher evaluations of the "Great SCUD hunt". The head of Israeli Air Force Intelligence, for one, asserts there is no proof that the Allies destroyed *any* Iraqi missile launchers during the Persian Gulf War.[194] Another, defense analyst Norman Friedman, simply calls counter-SCUD operations a failure.[195]

Although the survivability of mobile missiles is obvious (especially when contrasted to that of the Iraqi Air Force), these systems were not immortal. Indeed, available data suggests that Iraqi SCUD strikes were significantly degraded by the Allied air suppression campaign. SCUD launches declined from an average of five per day in the first 10 days of the war to only one per day over the final 33 days as a result of pressure from Allied counter-SCUD activities.[196] Additionally, Iraqi missile troops were forced to launch only at night by Allied counter-SCUD efforts.

These data suggest that, while not perfect, counter-force/missile suppression efforts are worth pursuing. Israel, for one, remained convinced of this proposition throughout the war. Consequently, Israeli military theorists continued to emphasize the importance of mounting offensive operations to destroy these weapons as part of a multi-faceted strategy for countering SCUDs.[197]

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191 Lennox, op. cit., p. 49.

192 Powell, op. cit., p. 50.

193 General Merrill A. McPeak as quoted by Powell, op. cit., p. 51.

194 "Israeli General Sneers At U.S. Scud Strikes", *Washington Times*, January 3, 1992, p. 2.

195 Norman Friedman as quoted in Smith, op. cit., p. 1.

196 Smith, op. cit., p. 1.

197 C.J.D. Thomas, "How Israel Saw Iraq During The Gulf War", *Rusi Journal*, Winter 1991, p. 39.

LESSON 4: THE INITIAL PERIOD OF WAR IS CRITICAL

Russian military theorists emphasize that Allied Gulf operations reinforce the traditional importance accorded to the initial period of war by Soviet military doctrine. Some claim that the initial period had an "enormous influence on the subsequent course of military actions".[198] Indeed, others argue that the entire outcome of the Persian Gulf conflict was determined "in the first few minutes".[199] A third set of Russian military strategists go even farther. They assert that the initial period of war has become so important that will be "essentially the *only* period in future war".[200]

British military observers have also noted the importance of the early phase of the war. Advances in modern technology allowed the Allies to carry out parallel attacks on multiple targets during the air phase of the war.[201] This, in turn, overwhelmed the capabilities of the Iraqis to repair and to bring targets back on line. The rapidity of Allied attacks during the initial air phase simply caused the Iraqi military system to "collapse".[202]

American strategists also emphasize the importance of Allied actions in the opening phase of the war. In parallel with Russian thinking, American observers argue that the Allies gained the strategic initiative in the opening minutes of the war. Once this happened, "there was no turning back [for the Iraqis], no opportunity to recapture the initiative".[203]

LESSON 5: SURPRISE CAN BE DECISIVE

Soviet military analysts are also claiming that initial Allied missile and air strikes in the Gulf demonstrated that operational surprise can exert a "decisive" influence on the entire course of the war.[204] Some Russian generals even claim that the skillful application of surprise "guarantees a victory".[205] A department chairman at the former Soviet General

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198 General-Lieutenant A.I. Yevseyev as quoted by Fitsgerald, op. cit., p. 415.

199 General-Lieutenant V. Gorbachev, as quoted by Fitsgerald, p. 415.

200 General Major Slipchenko as quoted by Fitsgerald, op. cit., p. 415.

201 Irving, op. cit., p. 14.

202 Ibid., p. 14.

203 Joseph Douglas, Jr., "A Disquieting Look At The U.S. Gulf War Strategy", *Aerospace and Defense Science*, Summer 1991, p. 10.

204 General-Lieutenant N.G. Popov as quoted by Fitsgerald, op. cit., p. 414.

205 General-Major Vorob'yev as quoted by Fitsgerald, op. cit., p. 414.

Staff Academy takes these notions even further. He concludes Iraq had only "one option from a military point of view--to deliver a preemptive strike".[206]

Russian views on the increasing importance of surprise and the initial period of war suggest that one of the war's primary lessons for them was that "old thinking" was correct.[207] That is, they seem to believe that traditional notions about the importance of preemption and offensive preeminence need to be resurrected.[208]

LESSON 6: DECEPTION PAYS LARGE DIVIDENDS

Third World leaders may also come way with the idea that tactical deception and camouflage promote missile survivability.[209] As Russian general officers who analyzed the war have noted, skillful use of decoy missile launchers and communications networks deceived the Allies as to the actual location of high-value missile assets.[210] What is more, Iraqi mockups of tanks, aircraft, and missile launchers "duped" Allied pilots into dropping "thousands of tons of explosives on decoys".[211] (Then Chief of Staff of Soviet Air Defense Forces, General Colonel I.M. Maltsev, claims that up to 50 percent of initial Allied missile and air strikes were carried out against false targets because of successful Iraqi deceptions.[212]) From this, Russian military commentators conclude that cheap decoys offer a way of seriously degrading the effectiveness of costly, high-precision U.S. weaponry.[213]

Strategic deception prior to the war about the total number of SCUDs and mobile missile launchers greatly complicated Allied operational planning and mission effectiveness assessments of Iraqi capabilities. Shortly after the war, General Schwarzkopf acknowledged this problem. Indeed, estimates of the number of Iraqi missile launchers

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206 General-Lieutenant V. Gorbachev as quoted by Gross, op. cit., p. 142.

207 Gross, op. cit., p. 142.

208 Ibid., p. 142.

209 "Lessons Of The Gulf War", *European Security Analyst*, April 1991, p. 5.

210 Natalie Gross, "Soviet Generals Watch the Gulf War", *Jane's Soviet Intelligence Review*, March 1991, p. 142.

211 Captain 1st Rank, Anatoily Slobozhanyuk, " Opinion of a Military Observer: Whom Will 'Desert Storm' Sweep Away?", *Selskaya Zhizn*, February 1, 1991, p. 3 as translated in FBIS-SOV-91-025, February 6, 1991, p. 34.

212 General Colonel Igor M. Maltsev as quoted by Brian Collins, "Soviet View Of The Storm", *Air Force*, July 1992, p. 72.

213 Gross, op. cit., p. 142.

ranged widely from a low of 16 to a high of 225--all as a result of successful Iraqi strategic deception.[214]

The practice of strategic deception was not confined to Iraq. The Allies also carried out three major deceptions--two by land and one by sea--to put Iraqi forces at a serious disadvantage.[215] As a result, the Allies avoided the war of attrition which was a linchpin of Iraqi military strategy.

LESSON 7: ELECTRONIC COUNTERMEASURES ARE ESSENTIAL

Many observers view the Gulf War as the first real "electronics war".[216] This was possible because Allied forces were "saturated" with the latest combat gear, especially equipment useful for carrying out electronic warfare.[217] What is more, the Gulf War marks the first time in history, according to Russian observers, that electronic warfare was carried out on such a wide scale.[218] Not only did the Allies use electronic warfare extensively, they were "quite skillful" at it.[219]

Of particular interest, and concern, was the use of electronic countermeasures to disable the Iraqi defenses. Electronic jamming equipment was used in the first hours of the war to "blind" Iraqi air defenses.[220] This was done by generating radar interference, blocking Iraqi signals intelligence efforts, jamming communications frequencies, and generally hindering Iraqi's ability to detect incoming attackers. Russian observers emphasize that, conversely, Iraq's lack of electronic countermeasures greatly reduced its ability to protect its military assets or to strike back.[221] This inability, in turn, caused Iraq to sustain large military losses.[222]

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214 Smith, op. cit., p. 1.

215 Barton Gellman, "Allies Prevented War Of Attrition With Deception", *The Washington Post*, February 28, 1991, p. 1.

216 Freedman and Karsh, op. cit., p. 20.

217 *Krasnaya Zvezda*, January 25, 1991 as quoted by Gabriel Schoenfeld, "The Loser of the Gulf War Is...the Soviet Military", *The Wall Street Journal*, March 19, 1991, p. 24.

218 Colonel M. Ponomarev as quoted by Neil Munro, *Defense News*, February 11, 1991, p. 43.

219 Major General N. Kostin, "Specialist's Opinion", *Izvestiya*, February 8, 1991, p. 6 as translated in FBIS-SOV-91-028, February 11, 1991, p. 20.

220 Ibid., p. 20.

221 Fitzgerald, op. cit., p. 408.

222 Ibid., p. 408.

Russian military theorists have drawn some significant and far-reaching conclusions from successful Allied employment of electronic warfare and countermeasures in the Gulf War. Lieutenant General A.I. Malyukov (then Chief of Staff of the Soviet Air Forces) for example, argues that electronic warfare is no longer a supporting function. After the Gulf War, it has become a main component of armed conflict.[223]

LESSON 8: BALLISTIC MISSILE DEFENSES ARE FEASIBLE, BUT NOT PERFECT

Patriot performance in the Persian Gulf demonstrated the operational feasibility of anti-missile defenses in actual combat for the first time.[224] At the same time, after-action evaluations of Patriot by Americans, Israelis, Syrians, and Russians all concluded that Patriot performance was far from perfect.[225]

The Syrian Defense Minister, for example, claimed that Patriot missiles "turned out to be not that reliable" in dealing with Iraq's "long-obsolete" SCUD missiles.[226] According to him, the Syrian military's analysis suggests that at least 30 percent of the SCUDs hit their targets.[227]

Although sources disagree about the degree of Patriot effectiveness, there is general international consensus that missile defenses exhibited several generic shortcomings. These comments suggest that future:[228]

- Missile defenses must intercept enemy missiles and warheads at greater range and at higher altitude to reduce collateral damage from falling missile debris.
- ATBM kill mechanisms must be more lethal to assure full destruction of incoming warheads.
- Layered defenses are better than the present single-tier variety.
- ATBM tracking and discrimination mechanisms must become more robust; e.g., be able to handle decoys and to ignore false targets.

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223 Lieutenant A.I. Malyukov as quoted by Collins, op. cit., p. 73.

224 Dov S. Zakheim, "Top Guns: Rating Weapons Systems In The Gulf War", *Policy Review*, Summer 1991, p. 18.

225 For a fuller discussion of Third World views of ballistic missile defenses see Andrew W. Hull and David R. Markov, *The Emergence of Ballistic Missile Defenses In The New World Order*, SDIO, July 1992.

226 General Mustafa Talas as quoted by Mustafin, op. cit., p. 16.

227 Ibid., p. 16.

228 C. Robert Zelnick, "Patriots and Propaganda: Lessons for Missile Defense", *The Christian Science Monitor*, June 22, 1992, p. 18.

- ATBMs must be prepared to handle the massed firing of missiles.

Almost universal recognition of these ATBM shortcomings in the Gulf War has prompted analysts to predict the U.S. will pursue a vigorous improvement program for Patriot as well as develop new ATBM models.[229] Near-term defenses in Third World nations may also be upgraded by purchasing the Russian S-300/family of missiles because the Russians claim that present S-300 performance already exceeds Patriot's capabilities by a wide margin.[230] They allege the S-300 has a larger warhead, greater range, multiple target capability, as well as being a mobile system which takes less time to set up than Patriot.[231]

Be that as it may, the Syrian Defense Minister still believes that defenses will never be perfect. Indeed, he thinks that no matter how anti-tactical ballistic missiles are improved in the future, at least 10 percent of the attacking missiles will reach their targets.[232]

LESSON 9: DEFENSE SUPPRESSION IS IMPORTANT

The value of suppressing air defenses through fire is one of the major lessons of the war for Russian observers.[233] Time and again Russian military commentators note that a significant element of Allied success sprang from their undisputed air superiority in the Kuwait Theater of Operations. They say that this, in turn, was due to the successful Allied suppression of the Iraq air defense network at the very outset of the fighting. In view of Patriot's success against SCUDs, there is a strong temptation for nations to generalize this lesson of suppressing air defenses to ATBM defenses as well, especially since existing ATBM capabilities reside in dual capable SAM/ATBM systems.

LESSON 10: BALLISTIC MISSILE DEFENSES ARE ESSENTIAL

The threat posed directly to the populations of Third World nations by ballistic missiles was one of "the starkest lessons" of the Gulf conflict according the editor of *Jane's Strategic Weapons Systems*.[234] Indeed, developing reliable ways to intercept and destroy

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229 Zakheim, op. cit., p. 18.

230 "The S-300 Is More Effective Than Patriot", *Krasnaya Zvezda*, June 27, 1991, p. 2 as translated in JPRS-UMA-91-020, July 25, 1991, pp. 30-33.

231 Ibid., p. 31.

232 General Mustafa Talas, as quoted by Mustafin, op. cit., p. 16.

233 Collins, op. cit., p. 73.

234 Duncan Lennox, "The Shield Turns Skyward, "*Jane's Defense Weekly*, January 11, 1992, p. 49.

ballistic missiles are become "of prime importance."[235] Consequently, we see three general trends emerging with respect to missile defenses: (1) heightened U.S. and Russian interest in deploying some type of limited defense (especially ground-based tactical or theater type systems), (2) increasing Third World resolve to acquire their own missile defense capabilities, and (3) increased availability of defensive systems in the international arms market.[236]

CONCLUSIONS

Although much of the preceding discussion has drawn heavily upon American, British, and Russian commentary about what happened in the Gulf War and its implications. These views have great relevance for emerging Third World views about future force structures, equipment, and strategies because all three are heavily involved in training Third World armed forces. Understanding Russian views may be especially important since they have been the primary military advisors to many Third World's emerging ballistic missile powers; e.g., Libya, Iraq, Iran, India, Syria, and North Korea. Thus, American, British, and Russian insights are likely to shape the debate about the lessons of the Gulf War among Third World military planners.

A number of important implications can be drawing from the foregoing lessons, provided of course that Third World military establishments in fact accept the validity of those lessons. These include:

- The demonstrated strategic value of missiles, coupled with Third World assumptions that future ATBM systems will never be perfect, suggest continued growth in Third World interest in acquiring and using ballistic missiles. Indeed, extensive Middle Eastern purchases of North Korean SCUDs immediate after the Gulf War suggests this process has already begun.
- The inability of Iraqi SCUDs to carry out militarily significant missions, plus perceived Patriot shortcomings, suggest that Third World nations will want to modernize their missile inventories. More specifically, this is likely to include increasing missiles' range, accuracy, and payload. Additionally, Third World nations also may be interested in ways of degrading expected ATBM defenses with decoys and electronic jamming as well as through extensive strategic and tactical deception.

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235 Ibid., p. 49.

236 For a fuller discussion about the growing importance of defenses, see Andrew W. Hull and David Markov, *The Emergence of Ballistic Missile Defenses In The New World Order*, SDIO, August 1992.

- The survivability of Iraqi SCUD missile launchers should increase the percentage of mobile missiles in future Third World ballistic missile inventories.
- International discussion of the importance of surprise, the decisive nature of the initial period of war, and the partial success of SCUD suppression activities encourages the use of preemption, first strikes, and the massed employment of ballistic missiles as early in future conflicts as possible. It may also encourage suppression of missile defenses through active measures like fire and by passive techniques like jamming.

The foregoing suggests that General Colin Powell's comment at the beginning of this paper about the Gulf War being a "change agent" is probably right on the mark.[237] Similarly, the Russians are probably correct in arguing that the lessons of this war will affect the entire "spectrum of military structures" in future.[238] We believe that these two perspectives apply equally to the Third World as to the West and Russia. Consequently, one should expect to see significant changes in the equipping, use, and structuring of future Third World ballistic missile forces as they absorb and apply the "lessons" of this conflict.

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237 General Powell, op. cit., p. 11.

238 Major General Kutsenko, op. cit., p. 42.

VI. THE EMERGENCE OF BALLISTIC MISSILE DEFENSES IN THE NEW WORLD ORDER

Over the last 5 to 10 years, the potential of ballistic missile defenses--especially tactical or theater defenses--has received growing international attention. But until recently, the bulk of that interest was in the context of the overall U.S.-Soviet Cold War rivalry. This pattern, however, is changing in the emerging new world order as the result of two seminal events: (1) the Gulf War against Iraq, and (2) the collapse of the Soviet Union.

Because of these two events, more nations want to acquire tactical or theater ballistic missile defense systems as part of their overall security strategies. At the same time, there are unprecedented opportunities to do so. Indeed, we see three general trends emerging with respect to defenses: (1) heightened U.S. and Russian/CIS interest in deploying some type of limited defense (especially ground-based tactical or theater type systems), (2) increasing Third World resolve to acquire their own missile defense capability, and (3) increased availability of defensive systems in the international arms market.

A. GROWING DESIRE FOR DEFENSES

Consideration of missile defenses ceased being "an intellectual exercise" when Iraqi SCUDs began falling on cities and when television showed Israelis huddled in sealed apartments with gas masks, awaiting the next strike.[239] Indeed, the threat posed directly to the populations of Third World nations by ballistic missiles was one of "the starkest lessons to be learnt (sic) from the Gulf conflict" according to the editor of *Jane's Strategic Weapons Systems.*[240] Consequently, developing reliable ways to intercept and destroy ballistic missiles has become "of prime importance."[241]

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239 James R. Asker, "Allies Show New Interest in SDI, Theater Missile Defense Research," *Aviation Week and Space Technology*, June 17, 1991, p. 105.

240 Duncan Lennox, "The Shield Turns Skyward," *Jane's Defense Weekly*, January 11,1992, p. 49.

241 Ibid., p. 49.

This lesson was driven home graphically and viscerally to defense planners and average citizens by extensive, worldwide television coverage of the Gulf War. Despite the sophisticated, and often arcane, arguments of defense specialists denigrating system effectiveness, the man in the street came to believe that defenses were necessary and could work because of what he saw on television. Even critics of missile defenses concede that media coverage of Patriots firing on Iraqi SCUDs had "a magical effect on the public's perception of events."[242]

Television's effect was not only dramatic, it was far-reaching as well. As related by the Russian Press, a Columbian couple named their son "Patriot" because they were greatly impressed by the Patriot missile's performance in the Persian Gulf.[243] Television footage from the Gulf impressed the American public as well. This, in turn, forged a growing consensus in Congress immediately after the war for supporting both theater and strategic missile defenses.[244] These same concerns also prompted President Francois Mitterrand to ask rhetorically in a June 1991 speech to the French National War College: "What could be the place of a limited defense against ballistic missiles?"[245]

Military planners and political leaders around the world also saw that missile defenses produced significant political and psychological effects. Defenses kept Israel from entering the war, reassured Saudi and Israeli citizens of their governments' interest in them, and showed the world that Iraq's most potent tactic--terror by missiles--could be blunted by BMD technology.[246] There is no more eloquent testament to the latter point than a letter written by a schoolgirl to one of the U.S. soldiers operating a Patriot battery outside her home in Israel:

> I'm looking through my window and I see many soldiers running in the rain. I know that this is a camp of Patriot missiles and because of that I don't feel anxiety anymore.[247]

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242 Theodore A. Postol, "Lessons of the Gulf War Experience with Patriot," *International Security*, Winter 1991/92, Vol. 16, No. 3, p. 119.

243 Lt. Col. A. Dokuchayev, "The S-300 Is More Effective Than the Patriot," *Krasnaya Zvesda*, First Edition June 27, 1991, p. 2, as translated in JPRS-UMA-91-020, July 25, 1991, p. 30.

244 William J. Broad, "Quietly, Lawmakers Prepare to Approve An Antimissile Plan", *The New York Times*, November 18, 1991, p. 1.

245 Asker, op. cit., p. 105.

246 Postol, op. cit., p. 121.

247 As quoted by Robert M. Stein, "Patriot ATBM Experience in the Gulf War," p. 21.

Events in the Gulf conflict also demonstrated the military price that governments were willing to pay for achieving such political and psychological ends. General Schwarzkopf initially dismissed SCUD attacks as "militarily insignificant" and implied that they would have little impact on the overall course or outcome of the war.[248] However, as media coverage of SCUDs striking cities jolted public confidence and as fears of chemical attacks increased, Allied military commanders were forced by political imperatives to divert 10 to 25 percent of their air sorties to hunting SCUDs.[249] Such diversions, coupled with bad weather, ultimately lengthened the air campaign by about one third.[250] Conversely, more/better ballistic missile defenses in the future offered an alternative to diverting military assets needed to accomplish other strategic objectives.

Military operations in the Gulf also demonstrated the difficulty of completely suppressing enemy missile strikes through counterforce strikes at missile launchers. Counterforce tactics could greatly reduce enemy missile activity. But as the number of launchers declined, it became increasingly hard to find the remaining mobile missile launchers. (This phenomenon is somewhat akin to the law of diminishing marginal returns in economics.)

Given the inability of offensive forces to completely suppress enemy missile strikes, defenses became increasingly attractive if only as a supplement to offensive systems. Such thinking has profound implications for some Third World defense strategies. Israel, for example, seems to be debating a move away from its traditional offense--dominated strategy to a more balanced strategy as a result of both the threat posed by ballistic missiles and the promise inherent in emerging anti-tactical ballistic missile (ATBM) technologies.[251]

However, it is important to note that, despite the West's emphasis on the ATBM aspects of these technologies in Gulf operations, Patriot missiles really represented *strategic* defenses to the Israelis and Saudis. That is, Patriots were employed to counter deep strikes into their homelands and to defend cities--both of which are really strategic missions.

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248 Stewart M. Powell, "SCUD War, Round Two, " *Air Force Magazine*, April 1992, p. 50.

249 Lawrence Freedman and Afraim Karsh, "how Kuwait Was Won: Strategy in the Gulf War", *International Security*, Fall 1991, p. 16.

250 Rick R. Smith, "Allies' Scud Hunt Came At A Cost," *The News and Observer*, January 14, 1992, p. 1.

251 Thomas, op. cit., p. 39. See also Robert Rudney, "GPALS Tempts Israel To Abandon Offensive Stance," *Armed Forces Journal*, February 1992, p. 42.

Thus, in large part it is because of these strategic implications that so many Third World nations are now interested in acquiring defenses against ballistic missiles.

The collapse of the Soviet Union, the emergence of four nuclear states in its wake, and the general turmoil associated with restructuring former Soviet military forces are seminal events whose impact is on a par with that of the Gulf War. These events have raised a host of disturbing questions. Are CIS nuclear forces really under control? If so, by whom? In the present fluid political circumstances, are there adequate guarantees against accidental or unauthorized launch of former Soviet ballistic missiles? Both U.S. and Russian/CIS authorities have publicly assured the world that positive control over former Soviet nuclear weapons and delivery vehicles is still adequate. Nevertheless, these questions keep resurfacing. And, to the extend one doubts such assurances, the more one wants at least limited missile defenses as a hedge against uncertainty.

Regardless of motive, there is growing U.S. interest in deploying at least limited ballistic missile defenses. According to one unidentified Senate aid, "The Gulf War left an indelible mark on the majority of the minds of Congress."[252] Indeed, according to the Chainman of the House Armed Services Committee, Les Aspin, "Defenses look more attractive" in the wake of the Gulf War.[253] Therefore, Congress passed the Missile Defense Act of 1991 which stipulates that the U.S. will field some type of limited, ground-based ballistic missile defense system by 1996.

The Gulf War "forces a completely different look at the significance of ABM [anti-ballistic missile] defense" according to a recent article in a Russian military journal.[254] Consequently, Russia too seems more interested in the potential benefits of limited, ground-based defense systems. (Replacement of the GALOSH ABM system around Moscow with the GORGON is a practical expression of that interest.[255]) This is because, in the words of Major General Viktor Samoilov (a member of the Russia State Committee on Defense), 15 to 20 more governments will have ballistic missiles by the year 2000 and

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252 Unidentified Senate aid, as quoted by Broad, op. cit., p. 1.

253 Les Aspin, as quoted by Broad, op. cit., p. 1.

254 Lt.Col. A. Ya. Manchinskiy, "Operation Desert Storm: Results and Consequences," *Moyennaya Mysl*, No. 1, January 1992, p. 91.

255 "Gorgon" Fielded, Says DoD Report," *Jane's Defense Weekly*, October 19, 1991, p. 690.

these missiles will be "a very serious threat [to Russia] in future."[256] Additionally, some Russians (including Yeltsin) have broached the idea of cooperation in the ABM arena i.e., a joint U.S.-Russian exchange of early warning information on the launch of ballistic missiles.[257]

Nations besides the U.S. and Russia have also expressed interest in acquiring or upgrading ballistic missile defense capabilities. Israel and Saudi Arabia, for instance, have both purchased Patriot batteries since the Gulf War and are seeking to buy others in future.[258] Similarly, Kuwait and the United Arab Emirates have begun negotiating the purchase of Patriot missiles from the United States.[259]

Besides purchasing additional Patriot batteries, Israel has also accelerated the development of the indigenously designed ARROW ATBM -- a project referred to as Defense Minister Arens "pet project" in Israel.[260] Since the war, Israel has also initiated development of the a second ATBM (the ACES) with greater capability to counter missiles armed with chemical warheads.[261]

B. GROWING AVAILABILITY OF DEFENSES

Concurrently with the heightened demand for missile defenses, there is also a growing number of potential suppliers. Increasing availability of missile defenses springs from three sources: (1) more potential suppliers, (2) economic pressures on many of them (especially on former Soviet defense industries) to sell weapons abroad to offset shrinking domestic defense spending, and (3) the potential migration or long-term contract employment of Russian scientists and engineers abroad.

According to defense trade journals, eight nations are presently pursuing R&D programs to develop systems with at least some ABM/ATBM capabilities. These nations

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256 Major General Viktor L. Samoilov, as quoted by John D. Morrocco, "Soviets Endorse U.S. Effort To Cooperate on ABM Systems," *Aviation Week and Space Technology*, October 21, 1991, p. 20.

257 Ibid., p. 20.

258 Stein, op. cit., p. 23.

259 Ibid, p. 23.

260 C.J.D. Thomas, "How Israel Saw Iraq During The Gulf War," *RUSI Journal*, Winter 1991, p. 39.

261 "Smaller Missile Version Now Planned: Israel, SDIO Want To Add Anti-Chemical Capability to Arrow ATBM,"*Inside The Army*, June 17, 1991, p. 16.

are: Russia, the U.S., Israel, France, Germany, Japan, Netherlands, and Taiwan.[262] In addition to these eight, there are another six working on selected aspects missile defense R&D in conjunction with the system developers just mentioned. These nations supporting the system development efforts of others are: the United Kingdom, Italy, Norway, Canada, Belgium, and Denmark.[263]

What is significant about this list is that some of them (e.g., France, Israel, and the United Kingdom) have traditionally depended on foreign military sales to drive down procurement costs for their domestic weapons purchases. Indeed, some of these nations may be unable to generate sufficiently high production runs even to maintain domestic programs without foreign sales.

Nations recognize these realities and consequently may be gearing development and eventual production of ABM/ATBM systems to the emerging international demand for missile defenses. Israel, for example, allegedly downsized the ACES ATBM, in part, to make it more marketable abroad.[264] In a similar fashion, trade journal advertisements for the EUROSAM are now appealing to the foreign buyers by stressing that it defeats "a wide variety of airborne threats," including "tactical missiles."[265]

Another strong impetus for spreading ABM/ATBM technology comes from the collapse of the former Soviet Union. "Precipitous [defense industrial] conversion," lack of bank credit, and declining Russian/CIS military orders have left the former Soviet defense industrial complex "devoid of the funds necessary for existence," in the words of Aleksey Shulunov, President of the League of Russian Defense Industries.[266] For all of these reasons, it is "necessary to look at new possibilities for arms trade, for arms exports."[267]

Defensive systems, like the ABM and ATBM systems, are particularly attractive candidates for foreign military sales because the are "purely defensive" weapons and so do not endanger world or regional stability. Consequently, Russian defense industrialists

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262 Lennox, op. cit., p. 51 and Asker, op. cit., p. 106.

263 Lennox, op. cit., p. 51 and Asker, op. cit.,p. 105.

264 "Smaller Missile Version Now Planned," op. cit., p. 16.

265 "Eurosam System: Demonstrations in Progress," *Aviation Week and Space Technology*, June 15, 1992, p. 57. This same advertisement also appeared in *Armed Forces Journal*, June 1992, p. 7.

266 Aleksey Sulunov and Vladimir Shibayev, "How To Deal In Arms?," *Rossiyskiye Vesti*, April 17, 1992, p. 3, as translated in JPRS-UMA-92-017, May 13, 1992, p. 35.

267 Ibid., p. 35.

emphasize there should be "a special attitude toward their sale".[268] Even if the foregoing justification for selling defensive arms is not valid, Russian weapons producers cannot afford to "ignore the realities of life."[269]

No segment of the Russian defense industry is more anxious to market its wares abroad than are the makers of the S-300/SA-10, the Russian counterpart to the Patriot. For example, the designer of the S-300 offered it to the Israelis at the Paris Air Show just after the Gulf War.[270] He did so apparently on his own initiative. At about the same time, the chief designer of the S-300 gave an interview with *Red Star* in which he touted the advantages of the S-300 over the Patriot for ATBM operations.[271] General Designer Boris Bunkin concluded this interview by saying if foreign buyers place orders for the S-300, "we will examine them promptly and attentively."[272]

The General Designer of the S-300 is not the only one interested in promoting its sale abroad. A recent article in *Izvestiya* emphasizes that "a number of states...will have a real commercial opportunity of obtaining the S-300."[273] This same article about the S-300 concludes that Russia will "evidently become a serious competitor in the world arms market" with this system.[274]

Clearly, the Russians are eager to sell the S-300 and related systems abroad. A measure of this eagerness is the recent attempt to entice Patriot into a shootoff against the S-300. In the words of the Commander of Moscow's air defenses, "Lets (sic) just take both of them to the range and organize a competition between them."[275] Producers of the S-300 and related ATBM--capable SAMs have also tried to interest foreign buyers since the

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268 Dokuchayev, op. cit., p. 32.

269 Veniamin P. Yefremov, General Designer at the ATNEY Scientific-Production Association, as quoted by Lt. Col. A. Dokuchayev, "Our Defense Arsenal: 'Tor' Versus 'Blue Bat'," *Krasnaya Zvezda*, August 1, 1991, p. 2, as translated in FBIS-SOV-91-153, August 8, 1991, p. 48.

270 Steven Zaloga, "The Red Patriot At Paris," *Armed Forces Journal International*, August 1991, p. 26.

271 Dokuchayev, op. cit., pp. 30-33.

272 Boris Bunkin, as quoted by Dokuchayev, op. cit., p. 33.

273 Vikton Litovkin and Dmitriy Khrupov, "S-300 Better Than Patriot, Our Generals Claim," *Izvestiya*, April 4, 1992, p. 3, as translated in FBIS-SOV-92-068, April 8, 1992, p. 3.

274 Ibid., p. 4.

275 Victor Litovkin, "New Russian Missile Challenges U.S. Patriot,"*We/Mbi*, May 4-17, 1992, p. 3.

Gulf War by showcasing these systems at air shows in Paris, the Philippines, Dubai, Berlin, and Russia.

Even if Russian firms were unwilling to sell ABM/ATBM systems, this technology might spread throughout the world via the migration or long-term contract employment of Russian scientists and engineers with the requisite skills. Many Russian defense workers are now feeling the effects of economic disruption for the first time in their lives and, as a consequence, are becoming desperate, demoralized, or both. Permanent migration or long-term contract employment abroad are potentially attractive answers to this problem. (A recent survey among Russian scientists revealed that 94 percent of them would be willing to work abroad either temporarily or permanently, if given the chance.[276]) This possibility is made more likely by a unique confluence of disincentives for technical specialists to stay, incentives to leave, and unprecedented opportunities to do so.[277]

Money is a powerful lure to people in such situations. Indeed, rumors of high salaries abroad apparently prompted a senior Russian scientist to offer air defense technologies on the eve of the Gulf War to a representative of an unnamed foreign government in exchange for 40 percent of the profits resulting from its introduction, plus jobs abroad for himself, his son, and two key assistants.[278] It is not unreasonable to suspect that designers of ABM/ATBM systems could be similarly tempted if economic conditions in Russia remain the same, or worsen in the near-term.

C. IMPLICATIONS

The general trends described in this paper have a number of far-reaching implications. The emergence of ABM technologies as real implements of war and, coupled with their increasing availability in the international arms market, may be just as revolutionary as the emergence of aviation technology in the 1930s or atomic weapons in the 1940s. These implications include:

- The actual employment of ATBM technologies in the Gulf War fundamentally change how they are perceived by defense planners around the world in the same

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276 Leonid V. Ksanformality, "Survival Before Science," *The Bulletin of the Atomic Scientists*, December 1991, pp. 21-22.

277 For a fuller assessment of the potential migration problem see Andrew W. Hull, "Assessing The Potential Migration of Russian/CIS Scientists and Engineers," SDIO, May 1992. (FOR OFFICIAL USE ONLY)

278 A. Mikhayov, "A Haunting 'Victim of Conversion'," *Lubyanka*, No. 2, April 1991, p. 2, as translated in JPRS-UMA-91-024, October 8, 1991, p. 71.

way that actually using atomic weapons in World War II forever changed how the strategic balance was calculated. Ballistic missile defenses are no longer just the subject of academic debates. Instead, they have proven combat value and have demonstrated the ability to make a significant strategic impact on the overall course of a war.

- Interest in acquiring missile defenses is no longer just a bilateral U.S.-Russian matter. As a result of the Gulf War, many Third World states want to possess and control their own defenses against possible missile attacks by their neighbors.
- More and more nations are coming to have indigenous missile defense R&D programs. Such proliferation of BMD technologies is largely outside the control of the ABM Treaty and the Missile Technology Control Regime. Thus, it is no longer just a bilateral U.S.-Russian decision whether missile defenses will exist and, if so, what capabilities they will have.
- Although the U.S. and Russia tend to discuss existing and emerging BMD technologies in the theater or ATBM context, these systems are really *strategic* defenses in the Third World context. This is because: (1) these systems perform strategic missions (e.g., population protection), and (2) they are used against enemy missiles that are capable of carrying out deep strikes of strategic significance into a Third World homelands.
- The proliferation of domestic BMD technology programs, coupled with growing Russian interest in selling its own defense systems abroad, means that Third World ballistic missile programs must assume the presence of defenses in all future conflicts for planning purposes. This, in turn, suggests that they have far more incentive for designing countermeasures into existing and future ballistic missile systems.

These trends, and their strategic implications, suggest that we are entering a new age -- one in which at least limited missile defenses are becoming a military fact of life. The missile defense genie is apparently already "out of the bottle" in the wake of the Gulf War and the collapse of the Soviet Union. What is more, it is probably impossible to put it back, given the trends that are currently emerging.